DOCUMENT RESUME

ED 370 466 HE 027 238

TITLE	The George Engelmann Mathematics & Science Institute. 1993 Annual Report Science Scholar Program.
INSTITUTION	Missouri Univ., St. Louis. George Englemann Mathematics & Science Inst.
PUB DATE	93
NOTE	82p.; For the followup study and evaluation, 1992 alumni, see HE 027 236; for the 1993 Annual Report, Scholar Research Program, see HE 027 237.
AVAILABLE FROM	George Engelmann Mathematics and Science Institute, 8001 Natural Bridge Road, University of Missouri, St. Louis, MO 63121-4499 ($30).
PUB TYPE	Reports - Descriptive (141) -- Reports - Evaluative/Feasibility (142) -- Tests/Evaluation Instruments (160)
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	*Academically Gifted; College Faculty; College School Cooperation; *Enrichment Activities; Higher Education; High School Students; Program Descriptions; Program Effectiveness; Program Evaluation; Resource Materials; School Community Relationship; *Science Education; Secondary Education; Student Attitudes; *Summer Science Programs
IDENTIFIERS	George Engelmann Mathematics and Science Inst MO; Saint Louis University MO; Scientific Thinking; *University of Missouri Saint Louis; Washington University MO

ABSTRACT

This publication is a comprehensive report on the George Engelmann Mathematics and Science Institute's Science Scholar program (SSP) and its activities in 1993. The SSP provides high achieving high school students an introductory, 4-week summer curriculum designed to demonstrate the connecting thread running through all scientific thought. The 52 participating students were taught by faculty from University of Missouri-Saint Louis, Washington University, and Saint Louis University. The report first provides basic information such as mission statement, and members of an advisory board. The second section gives a detailed description of the program including application and selection procedure, class profile and description of the program. The report also includes extensive details of a program evaluation. Among the evaluation findings were a nearly 100 percent increase between Science Subject Mastery Measure pre- and post-test scores, and positive student responses to opportunities to consider new scientific concepts, and to see different career opportunities ahead of them. In addition, data on past participants indicates that 91 percent are pursuing degrees in math, science, or engineering. Appendixes contain copies of many program materials including brochures, forms, lists of participants, participant statistics, program schedules, newsletter sample, presenters, syllabus, series speakers, lists of student research papers, scholar confirmation program and certificate of award, and student and mentor evaluation questionnaires. (JB)

ED 370 466

University of Missouri St. Louis
30 Years

1993 Annual Report

GEORGE ENGELMANN

MATHEMATICS & SCIENCE

INSTITUTE

Science Scholar Program

HE027238

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THE ENGLEMANN INSTITUTE
A Partnership to Enhance Science and Math Education

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The George Engelmann Mathematics & Science Institute

1993 Annual Report

Science Scholar Program

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GEORGE ENGELMANN
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MISSION STATEMENT

To enhance the understanding of the philosophy and processes of science and mathematics in high potential students and promote career interest in scientifically-oriented fields through integrating scholarly, social, and applied experiences developed through a partnership among schools, businesses, governmental agencies, and institutions of higher learning.

George Engelmann Mathematics & Science Institute
Science Scholar Program
1993

EXECUTIVE SUMMARY

The challenge of preparing our nation's youth for the demands of the work place in the coming century could not be more compelling. More than ever, we require talented professionals who are highly skilled in math, science, engineering and technological fields in order to retain our competitive edge in the national and international arenas.

Through an unusual partnership among schools, businesses, governmental agencies and institutions of higher education, the University of Missouri-St. Louis is responding to this critical challenge through a sophisticated and innovative network of precollegiate programs, one of which is the prestigious George Engelmann Mathematics & Science Institute. The Institute, launched in 1988, has become one of the most dynamic and successful precollegiate programs in St. Louis. It is also unique to the St. Louis community --and possibly the nation--because of its exclusive focus on math and science and the instructional approach it takes.

Specifically, the program comprises five major components that follow rising high school juniors and seniors through their college careers. This pipeline begins with an introductory, day-long, four-week summer curriculum designed to demonstrate the connecting thread running through all scientific thought. The 52 high school students who participate each year are taught by faculty from UM-St. Louis, Washington University and Saint Louis University in both lecture and laboratory situations on the UM-St. Louis campus.

Admission to the Institute is highly competitive; more than 45 percent of the students participating in the Institute rank either one or two in their high school class. For the 1993 class of 52 Engelmann Scholars, the program received 145 pre-screened applications from 69 high schools representing a wide variety of geographical areas and economic backgrounds. Historically, the program has been highly inclusive in terms of the schools represented; 90 of the 106 public, private and parochial schools that have recommended students to date have been represented at the Institute.

As with previous summers, the 1993 Engelmann Scholars experienced a continuity of theme within the Institute structure as they progressed through their high school academic course of study. An interdisciplinary curriculum titled "Unifying Concepts in Science" introduced the students to new and innovative areas of thought such as biophysics, psychobiology, digital thought, biotechnology, mathematics, statistics and the philosophy of science.

The activities of the Institute presented a variety of opportunities for learning and peer interaction. These ranged from laboratory experiments, lecture sessions and a guest speaker series, outside study, field trips to research-based institutions and corporations, career confabs, social activities, training in technical writing and a culminating research paper. On the final day of the program, students submitted their program notebooks, scholarly papers and gave an oral presentation on the paper before their instructors, peers and parents.

Prior to the onset of the program, students were given a series of standardized tests to measure their understanding of current science concepts, the nature of science and how science works. Following the Institute activities, corresponding post-tests were administered. As the data in the following report indicate, students' knowledge in these areas was significantly enhanced by their experiences at the Institute. To cite one example, their understanding of current science concepts nearly doubled based on Science Subject Mastery Measure pre- and post-test scores.

In addition to the above quantitative measures, an evaluation was conducted at the program's conclusion to assess the effectiveness of each program component as well as the Institute's overall impact. The findings are also presented in the following pages. The benefits mentioned most often by the students were the opportunities the Institute provided for them to consider new scientific concepts, new fields within science and mathematics, as well as the different career opportunities arising from them. As one student noted, "I got to see and feel a whole different side of science here than compared to my high school's curriculum." Additionally, another student found that, in terms of scientific theory, "it is important to doubt."

These quality experiences are what make the George Engelmann Mathematics & Science Institute such a precollegiate asset to the community. With each passing year, the visibility of the Institute is increasing as these positive experiences in math and science are made accessible to the best and brightest that St. Louis has to offer.

Additionally, the program's long-term impact can be measured by the impressive accomplishments of its alumni. Specifically, of the Engelmann Scholars who have graduated from high school to date, all are currently attending college, and 91 percent of these are pursuing degrees in math, science or engineering. One of the particularly encouraging results of the program is that more than 52 percent of these students have chosen to attend college in the state of Missouri, and many of these will no doubt elect to pursue careers in the state as they enter the work force.

Clearly, the George Engelmann Mathematics & Science Institute is achieving its major goals. We are immensely grateful for the generous support that ensured a successful 1993 summer program and are proud to present the following report on the program's accomplishments.

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George Engelmann Mathematics & Science Institute
SCIENCE SCHOLAR PROGRAM
Annual Report
1993

NEED

The current crisis in science, mathematics, and engineering education has been well documented. One study relates the situation as "A quiet crisis, as damaging as drugs or terrorism." Currently, gaps in the American technical work force imperil the nation's future. At the same time that skills in science, mathematics, and engineering education have become critical to the success of our society and our children, there has been a decline in science achievement scores of U.S. 17-year olds according to assessments of science. Since 1975, remedial mathematics courses in public, four-year colleges have increased by about 75% and now constitute one fourth of all mathematics courses taught in those institutions. It is obvious to most observers that science literacy must increases if we are to meet the challenges of the 21st century.

OVERVIEW

The George Engelmann Mathematics and Science Institute was started in the summer of 1988 as a component of the Partnership for Progress Initiative of the University of Missouri-St. Louis. It is designed to stimulate high ability students from St. Louis area high schools to pursue careers in science, mathematics, and engineering. The beginning program, the Science Scholar Program (SSP), is a four-week, intensive summer experience, where rising junior and senior students work with University faculty and mentor teachers in areas such as biophysics, biotechnology, digital electronics, ecology, statistical analysis, molecular biology, technical writing and philosophy of science in an interdisciplinary approach to learning. The Institute uses the University of Missouri-St. Louis classrooms, laboratories, and other campus facilities augmented by weekly field trips and guest speakers from business, industry, and government. Upon completion of the program, participants are conferred the distinction of Engelmann Scholar.

APPLICATION, SELECTION PROCEDURE, AND CLASS PROFILE

The application procedure for the Engelmann Institute's 1993 Science Scholar Program began in mid-December 1992. A letter (see Appendix A) explaining the program was sent to principals, counselors, and science and mathematics faculty at 105 greater St. Louis public, private, and parochial high schools. Enclosed in the packet was a brochure (see Appendix B) introducing the Science Scholar Program, nomination (Appendix C) and application forms (Appendix D). The recipient was encouraged to share the information with other members of the counseling staff, faculty, and sophomore and junior students who were qualified and interested in participating in the program. The application deadline was March 15.

One hundred forty-five applications were received representing 69 different high schools. Applications were reviewed for accuracy and completeness. Any additional information needed to complete an application was requested from either the applicant or high school personnel. The applications were reviewed by the Selection Committee composed of ten individuals from the private sector, higher education, and area high schools. Fifty-two applicants were selected, with two alternates, to participate in the 1993 Science Scholars Program. Letters (see Appendix E) were mailed on April 9, 1993 informing applicants as to the disposition of their application. Final participants in the program are listed in Appendix F.

The accepted class included: (1) forty-eight schools; (2) twenty-five juniors and twenty-nine sophomores; (3) forty-two caucasians, eight African-Americans, and four Asians; (4) thirty-three (61%) of the fifty-four successful applicants ranked one, two, or three in their class; (5) thirty-four (63%) of the fifty-four successful applicants had 4.00 or above GPAs; and (6) sixty-nine percent of the successful applicants had both verbal and mathematical standardized test score at the 90th percentile or above (see Appendix G).

1993 SCIENCE SCHOLAR PROGRAM

On June 13, 1993, students, parents, and guests were invited to an Orientation Program on the UM-St. Louis campus. Please see Appendix H for a listing of activities. Dr. Roosevelt Wright Jr., Vice Chancellor for Academic Affairs, UM-St. Louis, provided the welcome and Dr. Rickie L. George, Interim Dean, School of Education, UM-St. Louis, provided the greeting. Dr. Charles Granger, Director, Engelmann Institute presented the program's goals and objectives as specified in Appendix I and curriculum overview as presented in Appendix J. In the person of Dr. Steven W. Rowan, Professor of History, Dr. George Engelmann (1809-1884) visited briefly and provided the audience with recollections of his research and scientific contributions. A reception in the Research Complex Atrium followed.

The Engelmann Program, encompassing four weeks of concentrated learning and peer interaction, began on the following Monday, June 14. Students started each day at 8:00 a.m. in Advisory. This thirty minute activity allowed the development of a close, professional, and personal interaction between students and an outstanding high school science or math teacher. These four master teachers acted as mentors and scholar role models as well as to assist in instruction. An important activity that was planned and worked on during Advisory was the weekly *Engelmann Newsletter*. See Appendix K for an example of the student's work.

Following Advisory, students were introduced to hands-on laboratory activities such as Digital Thought & Action (laboratory involving the basics of circuit design and utilization), Biochemistry DNA Laboratory, Molecular Biology Laboratory, Laser Physics Laboratory, and Population Biology Laboratory. Students participated in experiments, made observations, recorded data, and prepared technical reports that explained their findings.

Hands-on experiences were supplemented with presentations in: (1) Theory and Thought in Mathematics (a series of lectures discussing the philosophy of mathematics, problem solving strategies, and challenges in the study of mathematics); (2) Variation and Uncertainty in Nature (a mini-course in statistical analysis, experimental design, and consideration of the definition of scientific truth as we understand it); (3) Philosophy of Science (a mini-course on the history, development of scientific thought, and the process of seeking truth); and (4) The Science Seminar Series (a four part mini-series that addressed related subject matter content in the interdependent disciplines of biology, chemistry, physics, and mathematics). The purpose of this sequence of activities was to start by introducing the students to a basic set of concepts, for example, some fundamentals of biochemistry, and then end up applying that information to a relevant problem, such as AIDS. Seminar speakers relied on student outside readings as well as individual guidance from the mentors to develop a comprehensive, interrelated theme. The first mini-series was: Basic Biochemistry, The Immune Response, and the Pathology of AIDS. The second mini-series included: Biotechnology, Molecular Genetics, and Genetics Engineering. The third mini-series involved Planetary Weather, the Birth of Stars, Cold Fusion, and Theory of Thought in Mathematics. The fourth and last mini-series examined Ecosystems, Populations, and Environmental Problems. Each mini-series had a hands-on lab that helped to demonstrate significant aspects of the mini-series.

Field trips to research based institutions and corporations illustrated the applied component of the Science Seminar Series and helped reinforce career opportunities, as well as subject matter concepts. Field trips were taken to Sigma Chemical Company, Monsanto Research Laboratories, McDonnell Douglas Corporation, and the Missouri Botanical Garden Research Center.

During the lunch hour students were systematically treated to Career Confabs that provided informal discussions or audio-visual presentations on potential careers in science or mathematics. Noted researchers from the St. Louis area made presentations and responded to student questions on career opportunities, educational requirements, and training. Appendix L lists the topics and presenters that the students heard throughout the summer.

Basics of Technical Writing helped sharpen the communication skills of the participants. The students learned the essentials of technical writing and oral presentations. The skills were valuable to the students in the development of their individual research projects and will be valuable in their pursuit of a career in science or mathematics. The syllabus for this condensed offering is included as Appendix M.

Students had an opportunity to apply some academic principles to two common sports. They were introduced to the physiology, physics, and fun of softball and volleyball. This activity provided an interface between the mental and physical development of the students in an academic setting.

Every week there was at least one social/educational evening activity. The first week Engelmann I students were joined by Scholar Research Program students and enjoyed a mixer and picnic at Shaw Park. During the second week students experienced the stars at the UM-St. Louis planetarium and observatory and then were treated to Ted Drewes ice cream. The third week students had fun at Union Station and then attended the St. Louis Cardinal/Philadelphia Phillies baseball game. During the final week, students enjoyed a pool and pizza party sponsored by the Pierre Laclede Honors College.

The final day involved the submission of the students' program notebook, their scholarly paper, and oral presentation of the research paper. Each student had ten minutes to present their paper and respond to questions from peers, mentors, faculty, and interested parents. See Appendix N for a list of student paper titles.

Commencement brought public recognition for the success experienced by the Scholars and a challenge address by Mr. David Price, Vice President and General Manager of the Monsanto Company. Mr. Price told students that an Engelmann Scholar "Must be a LEADER and Lift Expectations, and Demand Exceptional Results." See Appendix O for the commencement program and Appendix P for a sample commencement certificate.

EVALUATION

Data Collection and Processing

Subjective Measure

At the completion of the Science Scholar Program, all students were asked to complete a specially constructed questionnaire which sought their views about various aspects of their experiences and the degree to which they believed the program met its objectives. The questionnaire was reviewed with each of the advisory groups and questions answered at that time.

The students were given the following directions concerning the questionnaire. "The Institute would like to obtain your views about various aspects of the Engelmann Institute. It will help refine the program as we head into future years and a new group of scholars. Please be candid. Evaluate (1 Very Important-5 Not Important) in order of IMPORTANCE and evaluate (1 Low-5 High) for EFFECTIVENESS for each of the following activities. Your comments are critical to our understanding of the Engelmann Institute. Please write your feelings as much as possible."

Students were asked to take the questionnaire home and complete it during the week following the Institute. Forty-five of the fifty-one Engelmann Scholars returned their questionnaire. A copy of the Questionnaire is attached (Appendix Q).

Coding schemes were developed and all data was transferred to computer disc for analysis. Responses to open-ended questions were transcribed and content summarized.

Data Analysis

Overall means were computed for each activity and presenter and then ranked from highest to lowest. Table I displays the results. The activities that ranked highest in importance were Biochemistry (1.39), Field Trips (1.43), Essentials of Oral Presentation (1.49), Commencement (1.68), Science Seminars (1.70), and General Program Activities (1.70). Four of the six activities that ranked highest in importance also ranked highest in effectiveness. Essentials of Oral Presentation, Biochemistry (DNA) Lab, Field Trips, and Commencement were specified as having had maximum impact on scholars. Essentials of Oral Presentation provided students with a how-to-do it discussion and demonstration of the mechanism of preparing a scientific paper--skills that are needed to successfully complete the Institute, as well as, high school and college courses. Biochemistry (DNA) Lab provided students with hands-on experiences illustrating concepts, techniques, and mental processes associated with the contemporary and important issue of genetic engineering. Field trips to Sigma Chemical, Monsanto Company, McDonnell Douglas, and the Missouri Botanical Garden provided an applied, career focused experience. See Table I for a complete ranking of activity importance and effectiveness.

TABLE 1

Summary of Activity Mean Importance Rating, Mean Effectiveness Rating, and Corresponding Rankings

Activity	Mean Importance Rating	Rank	Mean Effective Rating	Rank
Biochemistry Lab	1.39	1	4.61	2
Field Trips	1.43	2	4.50	3
Sigma	1.70			
Monsanto	1.56			
McDonnell Douglas	1.84			
Mo. Botanical Garden	2.00			
Essentials Oral Presentation	1.49	3	4.69	1
Commencement	1.63	4	4.30	5
Presentation	1.88			

Activity	Mean Importance Rating	Rank	Mean Effective Rating	Rank
Science Seminar Series	1.70	5.5	4.05	10.5
Bryant	1.70			
Feldman	2.16			
Friedman	1.73			
Hunt	2.20			
Granger	1.95			
Schwartz	2.16			
Wilking	2.05			
Gen. Program Activities	1.70	5.5	4.05	10.5
Pre-Orientation	1.60			
Orientation	2.00			
Challenges	2.07			
Advisory	1.77	7	4.15	7
Molecular Biology Lab	1.80	8	4.13	9
Social Activities	1.82	9.5	4.47	4
Picnic	1.91			
Planetarium	2.14			
Baseball Night	1.75			
Pool Party	1.86			
Achievement & Assessment	1.82	9.5	3.93	13
Lab Write Ups	2.67			
Research Paper	1.53			
Oral Presentation	1.71			
Pre/Post Tests	2.78			
Peer Cooperation	1.47			
Athletics	1.87	11	4.29	6
Softball	1.93			
Volleyball	1.84			
Resume Writing	1.89	12	3.87	14
Library Workshop	2.07	13	3.73	15
Population Biology	2.09	14	4.14	8
Var. & Uncertainty in Nature	2.18	15	2.58	22

Activity	Mean Importance Rating	Rank	Mean Effective Rating	Rank
Digital Thought and Action	2.24	16	3.64	16
Thought & Theory in Math	2.24	17	4.00	12
Technical Writing	2.30	18	3.20	20
Career Confab	2.41	19	3.36	18
Barton	2.44			
Bissen	2.42			
Fuller	2.16			
Leventhal	2.46			
Swierkosz	2.32			
Murray	2.33			
Philosophy of Science	2.56	20	3.38	17
Orientation to Depts.	2.67	21.5	3.35	19
Laser Physics Laboratory	2.67	21.5	2.80	21

In addition to the Likert scale response questions, students were asked to respond to open-ended questions that sought information and opinions concerning program efficacy, enrichment, and impact. The first question asked "If you had to pick two activities to drop from the program, which would they be?" The most often mentioned activities and the number of times mentioned were Career Confab (11), Philosophy of Science (9), Orientation to Science Departments (7), Laser Physics Lab (7), Social Activities (6), Science Seminars (5), and Variation & Uncertainty in Nature (5).

The second question asked "If you could add any activity, what would it be?" Students indicated they would like additional academic activities, particularly in the areas of mathematics and computer science, and additional hands-on laboratory activities. Specific field trips to a medical center, auto assembly plant, and chemical company were also mentioned.

The third question asked "For your own development and understanding, which activity was most beneficial?" Biochemistry DNA Lab (15), Digital Thought & Action (5) and Molecular Biology Lab (2) were most often mentioned. Other activities mentioned include the preparation and presentation of the research paper (4), Philosophy of Science (4), Science Seminars (3), and social activities (3).

The fourth question asked "What would you change to make the program better?" Thirteen respondents indicated the program was too short and needed to be lengthened, five wanted fewer lectures, five wished they had started their research paper earlier, and four wanted more hands-on laboratory activities. A few others wanted more emphasis on mathematics courses and additional social activities.

The fifth question asked "What is the most significant thing you got from the Engelmann Institute?" The responses were quite varied, but focused in two main areas: (1) an increase in knowledge and appreciation for science and (2) meeting and making new friends and peers with similar interests in science and mathematics. Other significant happenings included technical writing skill development, presentation of a research paper, greater awareness of career information and opportunity, and improved self esteem or self awareness.

Selected comments include:

- "I was introduced to many ideas in science. I learned about group work and cooperation, met scientists, and toured companies."
- "New experiences in science. Opportunity to meet other people with same interests and abilities."
- "The chance to work with professors, talk to scientists, and see science up close was a real opportunity. I saw and felt a whole different side of science here than compared to my high school's curriculum."
- "A greater knowledge and appreciation for scientific and mathematical issues."
- "The entire program touched me in a very special way."
- "There wasn't one or two things that caught me. The Engelmann experience was significant."

The typical day for an Engelmann student began at 8:00 a.m. and lasted until 4:00 p.m. Each week there was a social/educational activity that may have lasted until 9:00 p.m. or later. The time of the schedule of events was "just about right" for 24 (55%) and "packed too heavily" for 20 (45%) participants.

Selected comments include:

- "To put more into the program would be too much."
- "Many times I felt overwhelmed, but challenged at the same time. The schedule was fine, when I didn't have any other commitments."
- "Even though it seemed packed at times, I'm glad because I would not have wanted any of the activities to be left off the schedule."

Engelmann scholars were asked "How beneficial was the Institute's overall program?" Three areas of benefit were mentioned most often. Scholars benefitted by acquiring a better understanding of career opportunities, students were introduced to and learned about new

areas in science and mathematics, and the Institute provided opportunities for students to think about new issues and ideas.

Selected comments include:

- "The Institute made me think about possibly going into some area of genetics rather than medicine."
- "I realized the diverse job opportunities in science. This was due to career confabs and the field trips."
- "I was first exposed to electronics and lasers. I was able to do the newest biology techniques which is especially helpful to research I am doing."
- "I learned a lot. Science seminars introduced me to new ideas. Everything we did in labs was challenging and made me think about different scientific concepts."
- "I usually just accept scientific thought and theory just because it's science. Dr. Granger and Mr. Griesdieck showed me that it is important to doubt."
- "I learned so much. All science seminars introduced me to new ideas. Everything we did in the lab was challenging and made me think about different scientific careers."
- "A scientist I will be!"

Engelmann participants have completed two or three years of high school before participating in the Institute and usually have had little, if any, experience with higher education institutions. Students were asked "How the Institute differed from their high school experiences?" Many mentioned the quality of the laboratory experiences and equipment. An equal number of students mentioned the commonality of interests and equality of participant academic abilities. The level of expectation and degree of difficulty for various activities was much greater than students had experienced in high school and, hence, they were more challenged. New curriculum material taught by mentors and university faculty was another factor that differentiated the Institute from high school. In addition, students were asked to think about and solve difficult and complex problems not usually introduced to students at the high school level. Generally, students enjoyed an improved learning environment because they wanted to be there, had a great attitude, and wanted to learn. Students also mentioned they liked being treated as adults.

Selected comments include:

- "How much you learn is not governed by grades at Engelmann, but by how much you want to learn."
- "Atmosphere much better because those who didn't want to learn did not have a place at Engelmann."
- "It was very organized and personalized. Mentors and professors were always willing to help and were very encouraging."

- "It provided challenging (on a perfect level to challenge but not overwhelm) activities which made me feel accomplished."
- "You didn't have to worry about your GPA and class rank and got to concentrate on learning."
- "The environment was relaxed and conducive to learning. Almost everyone wanted to do well and learn. You didn't have to worry about looking like a 'nerd' if you asked a question or turned in a good paper. "
- "The activities at Engelmann were in an environment where everyone was required to try new things and, if they failed, they were encouraged to go on and keep exploring while at high school the environment would not allow so many mishaps."

Most students were introduced to the UM-St. Louis campus for the first time and we were interested to know what perception students had based on their Engelmann Institute experience. Students mentioned most often the good research facilities and faculty, and generally were more aware and knowledgeable about the institution and its resources. Six students actually changed their negative or no opinion to a positive comment because of the Institute. Four students said they would consider UM-St. Louis as a choice for their college endeavor.

The Engelmann Institute has ten specific goals and objectives that guide the development of its curriculum and other programmatic aspects. The specific objectives are listed in Appendix I. A questionnaire was administered to the participants that allowed them to express to what extent they felt the program met its objectives. The questionnaire appears as Appendix Q. Obviously some objectives are more easily attained than others.

The data indicated that nine of the ten objectives were achieved to a significant degree and one objective was achieved to a moderate degree. Respondents indicated that the Institute (1) Provided the opportunity to interact with peers and reinforced similar interests and goals (4.67 out of 5); (2) Allowed them to develop scientific techniques in an open-ended problem solving setting (4.53); (3) Provided a framework in which to integrate the academic components of the program (4.42); (4) Enhanced the students' knowledge of topics in science (4.40); (5) Introduced the student to a wide variety of career opportunities (4:40); and (6) Provided the student with the opportunity to explore one or more scientific problems (4.33).

To a slightly lesser extent the Institute goals were met by (7) Providing an understanding of the philosophy of science and the total scientific enterprise (3.91); (8) Instructed students in technical writing and presentation of scientific papers (3.89); and (9) Provided the student with assistance and general help for continued work on independent student research projects (3.89).

Lastly and to a lesser extent, the Institute (10) Exposed students to the theory and application of statistical analysis (3.22 out of a possible 5).

In conclusion, students were asked to comment on the Engelmann Institute in general. Most were very positive and mentioned a number of things that contributed to the success of the program. Participants were pleased with the quality of mentors and faculty who kept them very busy (too busy for a few students) for four weeks. They would gladly make the decision to participate again and some look forward to participating next year in the Engelmann Research Scholar Program. A few students suggested that the program needs to have more free time and that the research paper should be started earlier. Most felt the program to be well rounded and allowed participants to explore a wide variety of topics while merging those who have similar interests and achievement to work together.

Selected comments included:

- "At times I felt overwhelmed, but I'm glad that I didn't quit."
- "Knowledge I gained will help me and remain with me for the rest of my life."
- "We need 'free time' the professors were always asking us to stop by and talk to them in our free time, but not one realized that we had no free time."
- "Engelmann is a very good program. I am very thankful that I received this excellent opportunity to be involved. I am sure what knowledge, experiences, etc., that I have received will help throughout my life."

Objective Measure

In addition to the questionnaire data received from student participants, a battery of three separate research instruments were administered to the students in a pre-post evaluation design to test the effectiveness of the program. The three areas of investigation included 1) knowledge gain, 2) attitude toward science, and 3) the understanding of the scientific enterprise.

The Science Subject Mastery Measure (SSMM) is a multiple choice examination testing knowledge of various aspects of science covered by the Engelmann Institute Summer Scholar Program faculty. It is a 117-question examination where the student is given one point for a correct answer and not penalized for incorrect answers.

The Test On Understanding Science (TOUS) is a test measuring the subject's understanding of what a scientist is and how science works. It consists of 60 multiple choice questions with correct responses being given one point and no penalty for incorrect responses.

The Science Attitude Inventory (SAI) is a 60-item standardized questionnaire measuring the subject's attitude towards and interest in science. Subjects are asked to respond whether they "agree strongly," "agree mildly," "disagree mildly," or "disagree strongly." The questions are divided equally between negative attitudes and positive attitudes. For positive attitudes, subjects are given 3 points for agreeing strongly, 2 for agreeing mildly, 1 for disagreeing mildly, and none for disagreeing strongly. The scoring

is reversed for negative attitudes (3 points are given for disagreeing strongly, 2 for disagreeing mildly, 1 for agreeing mildly, and none for agreeing strongly). The sum of all the points is the subject's score.

For the Science Subject Mastery Measure Pretest the scholar participants had a mean score of 30.18. Male students scored ten points higher than female students (36.37 versus 26.27). Four weeks later the participants were administered the posttest. The group mean was 57.65 - a gain of 27.47. The pretest-posttest difference (27.47) for the group was significant at the .001 level. Female "gain scores" were slightly higher than male "gain scores" (27.80 versus 26.74) and junior "gain scores" were slightly higher than senior "gain scores" (27.85 versus 27.04). See Table II.

TABLE II

The Science Subject Mastery Measure: Summary of Posttest, Pretest and Posttest - Pretest Scores

SSMM Posttest Measure

	N	MEAN	SD
Population	48	57.65	12.79
Male	19	63.11	13.17
Female	29	54.07	11.39

SSMM Pretest Measure

	N	MEAN	SD
Population	49	30.18	10.47
Male	19	36.37	13.17
Female	30	26.27	11.39

SSMM Posttest - Pretest Measure

	N	MEAN	SD
Population	47	27.47*	9.65
Male	18	26.74	10.13
Female	29	27.80	9.53

*t (46) = 200.04, $p < .001$

Statistical Analysis of the Test On Understanding Science pretest/posttest measures using the "t" test of parametric repeated measures design indicated a mean difference of 3.72 and a SD of 4.03. A "t" value of 6.33 was significant at the .01 level. This result provides objective evidence that the program is achieving its objective of enhancing the students' understanding of the philosophy of science and the total scientific enterprise.

Participant scores on the Science Attitude Inventory (SAI) correlated with the Science Subject Mastery Measure Posttest at the .001 level and with the TOUS Measures at the .01 level. The mean of the SAI scores increased by 5.68 points (Pre = 129.72 and Post = 135.40). The difference was statistically significant at greater than the .01 level indicating the program has provided a strong, positive increase in the way the students view science and the processes of science. See Table III for the statistical analysis of the pre-post test results.

TABLE III

The Science Attitude Inventory
(SAI)

Statistics	SAI		
	Pre	Post	Difference
N	50	50	50
Low Score	113	105	-8
High Score	149	156	7
Standard Deviation	8.59	13.13	4.54
Mean	129.72	135.40	5.68*

* t (40) = 4.354, $p < .001$

A correlation matrix for the student's age, SAI score, SSMMPRE score, SSMMPOST score, and TOUS score, was developed and shows the following relationships significant at .01 level: (1) age versus SSMMPRE, (2) age versus SSMMPOST, (3) SAI versus SSMMPOST, (4) SAI versus TOUS, (5) SSMMPRE versus SSMMPOST, (6) SSMMPRE versus TOUS, (7) SSMMPOST versus TOUS. See Table IV.

TABLE IV

Correlation Matrix for Variables:
Age, SAI, SSMMPRE, SSMMPOST, and TOUS

	SAI	SSMM PRE	SSMM POST	TOUS
AGE	.1505	.4892**	.4073**	.3027
SAI		.3641	.5074**	.4420**
SSMM PRE			.6588**	.5574**
SSMM POST				.5988**

** Indicates significance < .01

SUMMARY

Through the cooperative effort of schools, businesses, governmental agencies and institutions of higher learning, the Engelmann Institute has been able to provide students with a unique opportunity to develop their academic backgrounds and interests in the sciences and mathematics. The focused support of the private sector has allowed the Institute to expand from one program in 1988, serving fifty students, to five programs serving more than 400 students. This has been accomplished through a systematic sequence of activities which provide for the students' academic and socialization needs from their sophomore year in high school through their senior year in college. See Figure 1 for a schematic of the interactions of these programs.

Both the subjective and quantitative assessment data indicate that the Engelmann Institute is a highly successful program for facilitating the flow of talented young people into technical fields. The Institute has developed a curriculum and administrative model that may be applicable to a multitude of settings. To this end, the Institute has been actively exploring the possibility of establishing additional program sites at Saint Louis University in the metropolitan area and statewide through a University of Missouri initiative that would bring programs to the other campuses in the University System, Columbia, Kansas City and Rolla. Through this partnership of support and continued cooperation from all sectors, the program could eventually serve more than 1,500 students annually. This valuable partnership of schools, businesses, governmental agencies and institutions of higher learning has provided the expertise and resources which have the potential to reverse the decline in the availability of a scientifically literate work force.

THE GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUTE

PROGRAM DESCRIPTIONS

I (SSP)
SCIENCE SCHOLAR PROGRAM

- 52 Jr. or Sr. High Students.
- 4 weeks summer experience.
- philosophically and theoretically based.
- Advanced traditional lab experience.
- Instrumentation and process focused.

II (SRP)
SCHOLAR RESEARCH PROGRAM

- 35 rising Sr. H.S. students.
- 6-7 weeks summer experience.
- Application of philosophy and technique in research lab setting.
- One-to-one mentoring.
- Career investigation.

III (AYP)
ACADEMIC YEAR PROGRAM

- 400 Engelmann Scholars and guests.
- . Monthly meetings during school year.
- Highly career oriented with maximum exposure to a variety of research based institutions and corporations.
- Research Seminars and Forums.
- Socialization experiences.

IV (CASE)
COOPERATIVE FOR ADVANCED STANDING EXPERIENCE

- Open to all Engelmann, Missouri and N.S.F. Scholars.
- Available all year.
- University courses open to H.S. Sr. via dual enrollment.

V (CAES)
COLLABORATIVE FOR APPLIED EXPERIENCES IN SCIENCE

- Open to all Engelmann Alumna
- 75 College Students and 25 employers.
- Summer jobs program.
- Apply academic background to work-a-day research activities for remuneration.

Figure 1a. The Five Components of the Engelmann Institute.

PROGRAM LINKAGES AND STUDENT FLOW

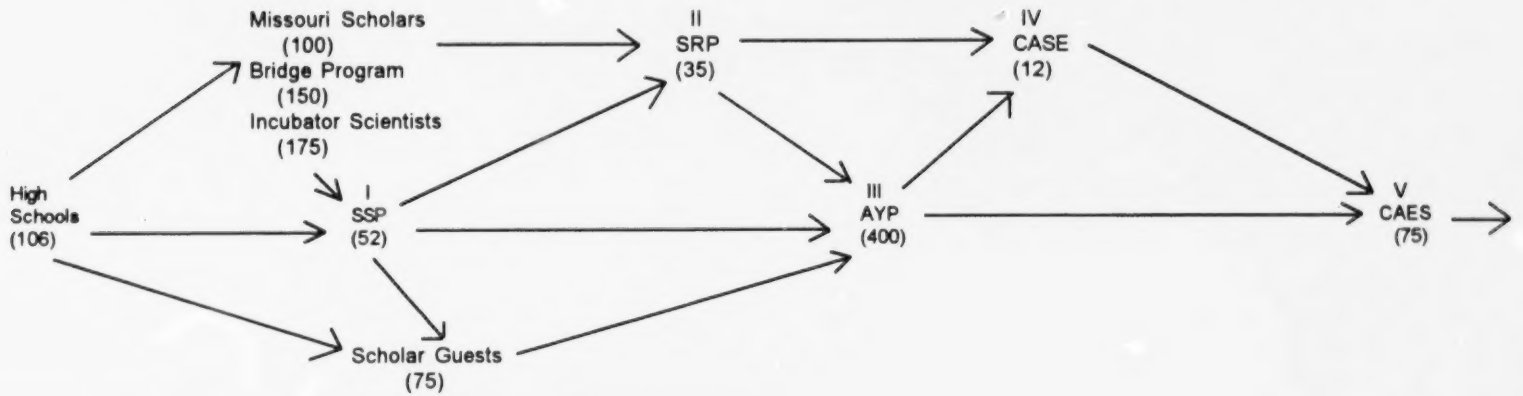

Figure 1b. The Pathways of Student Flow in the Engelmann Program Pipeline.

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UNIVERSITY OF MISSOURI-ST. LOUIS

8001 Natural Bridge Road
St. Louis, Missouri 63121-4499
Telephone: (314) 553-6226
Fax: (314) 553-6233

December 17, 1993

1?~ 2?~ 3?~
4?~
6?~
7?~
8?~ 9?~ 10?~

Dear 1?~ 3?~:

Secondary schools and universities need to work together to increase the number of young people pursuing careers in mathematics, science, and technology. We can foster student success through cooperative programs that provide academic challenge, social development and awards for achievement. Once again, the **George Engelmann Mathematics and Science Institute Science Scholar Program,** will be held at the University of Missouri-St. Louis from **June 20 - July 15, 1994**. This program is now in its seventh year and is offered at no cost to students.

Under the curriculum entitled "Unifying Concepts in Science," fifty-two students, in the upper 5% of their class, who have completed their sophomore or junior year in high school, attend the Engelmann Institute for a summer enrichment experience which integrates the major scientific disciplines and stresses an interdisciplinary approach to learning. We want you, your school, and your top students to be part of this innovative Institute.

Enclosed is a brochure introducing the **Science Scholar Program** at the Engelmann Institute, a nomination form, and an application form. Please share this information with members of the faculty and your sophomore and junior students, and encourage them to participate in this award winning program. We will be happy to visit your school to speak about the program and answer questions. If you need additional information, application or nomination forms, or would like a presentation for your students please contact us at 553-6226.

We hope your high school will recommend one or two of your top students with interest and high ability in science and mathematics. The deadline for applications for the 1994 Engelmann Institute is **March 15, 1994**. Thank you for your interest in the George Engelmann Mathematics and Science Institute and your willingness to help us serve your students.

Sincerely,

Charles R. Granger, Director
George Engelmann Mathematics
and Science Institute

Elizabeth C. Petersen, Coordinator
George Engelmann Mathematics
and Science Institute

/nkd
Enclosures

The Engelmann Institute is Sponsored By

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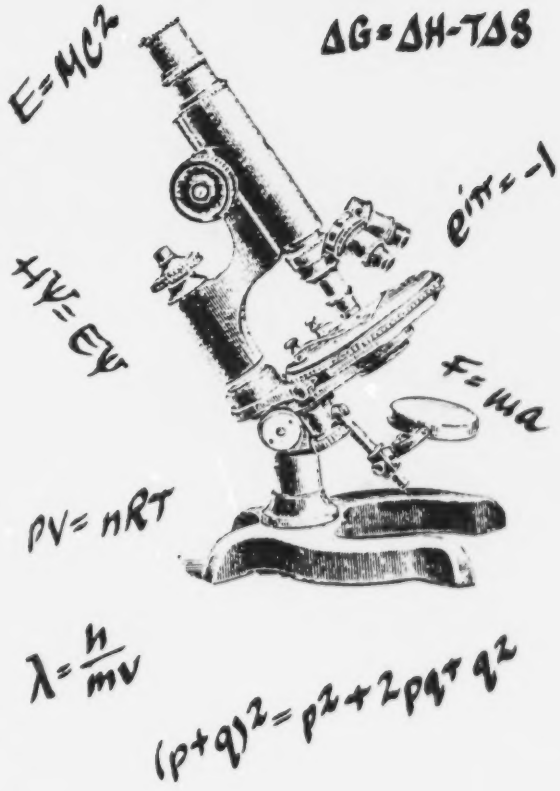


GEORGE ENGELMANN MATHEMATICS & SCIENCE INSTITUTE

THE GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUT

Science Scholar Program

"St. Louis is the center of North America, if not the world and of civilization!" These are the words of George Engelmann, a brilliant nineteenth-century scientific scholar and physician. Engelmann, scientific father of the Missouri Botanical Garden and a co-founder of the Academy of Science of St. Louis in 1856, serves as the inspiration for the George Engelmann Mathematics and Science Institute. The faculty and staff of the Engelmann Institute share Dr. Engelmann's commitment to academic excellence and his excitement about St. Louis. These principles form the basis for the Science Scholar Program (Engelmann I) that is conducted for four weeks beginning mid-June and running through mid-July. The Institute is an exciting effort to equip young people with advanced knowledge and skills in science and mathematics.

The Science Scholar Program selects fifty-two outstanding St. Louis area high school students, who have completed their sophomore or junior year, for a month of academic study. The students, to be designated Engelmann Scholars, must rank in the upper 5 percent of their high-school class and demonstrate aptitude and interest in science or mathematics. Engelmann Scholars attend this program free of charge.

During this summer enrichment program, the Engelmann participants study and conduct experiments under the guidance of outstanding university faculty using modern university level classrooms, laboratories, equipment, and other campus facilities.

The intensive course of study stresses an interdisciplinary approach to learning. The curriculum introduces these students to new and innovative areas of thought in philosophy of science, earth science, biophysics, psychobiology, digital electronics, molecular biology, physiology, statistics, and experimental design.

Weekly field trips and guest speakers, offered by St. Louis business and industry, supplement classroom and laboratory study.

St. Louis, a major center of industry, has a vested interest in increasing the number of mathematics and science graduates. Richard J. Mahoney, Chairman and Chief Executive Officer, Monsanto Company, states: "I am encouraged by this innovative Institute. With the continuous development of new technologies, we in industry need talented minds who are trained at the cutting edge. The Institute will introduce Engelmann Scholars to the challenges facing the scientific and industrial leaders of tomorrow."

Engelmann Scholars have the opportunity to use the resources available to regular university students. These include recreational facilities, libraries, and social and cultural events.

Engelmann Scholars represent the very best St. Louis has to offer. The Science

E

Scholar Program experience provides these outstanding students with intellectual enrichment and an important academic credential. These benefits will facilitate their pursuing academic and career goals at the college of their choice.

Application Process

Potential Engelmann Scholars should:

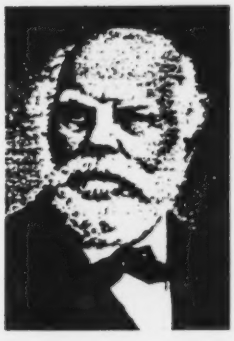
- ★ be enrolled in a St. Louis area public or private high school
- ★ have completed their sophomore or junior year by June
- ★ rank in the upper 5 percent of their high school class
- ★ demonstrate aptitude and interest in science and mathematics
- ★ be nominated by a mathematics or science teacher, guidance counselor, or principal
- ★ complete all application materials

Application and nomination materials are available by contacting:

Director
Engelmann Institute
8001 Natural Bridge Road
St. Louis, MO 63121-4499
Tel: (314) 553-6226

Application Deadline:
March 15

Dr. George Engelmann,
1809–1884
Scientific Father of the Missouri Botanical Garden and Co-Founder and First President of the Academy of Science of St. Louis.



"St. Louis is the center of North America, if not the world and of civilization!"

Echinocereus reichenbachii
Drawing by Dr. George Engelmann, 1845

The George Engelmann Mathematics and Science Institute

I. *Science Scholar Program (SSP)*

Invites 52 rising junior or senior students, in the upper 5% of their high school class, to a four-week summer enrichment experience stressing an interdisciplinary approach to learning, and integrating the major scientific disciplines as well as communication of knowledge in both written and oral form. Students are named Engelmann Scholars upon completion of the program.

II. *Scholar Research Program (SRP)*

Provides those Engelmann Scholars, who participated as rising juniors, with the opportunity to return to the Engelmann Institute to do research projects in biology, chemistry, earth science, engineering, mathematics, physics, or psychology under the supervision of a mentor scientist. Upon completion of this six week program students are commended National Science Foundation Young Scholars.

III. *Academic Year Program (AYP)*

Recognizes the intellectual needs of the Scholars by continuing positive relationships developed during the summer between faculty and students and among peers, and reinforces the students' confidence in their competence. Ten monthly seminars, career discussions, and research forums are held September through May.

IV. *Cooperative for Advanced Standing Experience (CASE)*

Allows outstanding high school seniors, who have received recognition as Engelmann Scholars, N.S.F. Young Scholars or Missouri Scholars, the opportunity to enroll in the Pierre Laclede Honors College or other university programs in the St. Louis area. They complete the academic program of their high school senior year on the campus as an early entry freshman while, at the same time, maintaining their senior class standing at their high school.

V. *Collaborative for Applied Experiences in Science (CAES)*

Matches Engelmann Institute graduates with St. Louis area science or engineering based companies, health care providers, and institutions of higher education for summer work experiences. Engelmann graduates who wish to participate in this program complete a detailed questionnaire that records the student's course work, experience the student has had in laboratory or clinical settings, research projects the student has completed, and career objectives. Students have the opportunity to practice their academic achievements in real world research settings while learning additional applied skills. This program serves post-high school students through their senior year in college.

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THE GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUTE
SCIENCE SCHOLAR PROGRAM
UNIVERSITY OF MISSOURI-ST. LOUIS

NOMINATION FORM

ENGELMANN I

APPLICATION DEADLINE MARCH 15, 1993

CONFIDENTIAL CONFIDENTIAL CONFIDENTIAL

NOMINATION AND RECOMMENDATIONS

(TO BE COMPLETED BY TEACHER, COUNSELOR, OR ADMINISTRATOR. ALL REPLIES WILL BE CONFIDENTIAL.)

NOMINEE'S NAME:_____

NAME OF HIGH SCHOOL:_____

SCHOOL ADDRESS:_____ ZIP CODE:_____

NAME & TITLE OF NOMINATOR COMPLETING THIS FORM:_____

TELEPHONE NUMBER OF NOMINATOR: WORK:_____ HOME:_____

HOME ADDRESS OF NOMINATOR COMPLETING THIS FORM:_____

HOW LONG HAVE YOU KNOWN THE NOMINEE?_____ IN WHAT CAPACITY?_____

SIGNATURE:_____ DATE:_____

PLEASE ATTACH A COMPLETE TRANSCRIPT TO THIS NOMINATION.

PLEASE GIVE US YOUR BEST EVALUATION OF THIS NOMINEE. CHECK THE STATEMENT IN EACH OF THE CATEGORIES THAT BEST DESCRIBES THE STUDENT. FEEL FREE TO EXPLAIN YOUR CHOICES DIRECTLY ON THIS SHEET.

I. POTENTIAL MATCH

1) ❑ THIS NOMINEE WOULD BE THE MOST QUALIFIED STUDENT I KNOW WHO IS ELIGIBLE FOR THE ENGELMANN INSTITUTE.
2) ❑ THIS NOMINEE IS WELL SUITED FOR A RIGOROUS ACADEMIC PROGRAM LIKE THE ENGELMANN INSTITUTE.
3) ❑ THIS NOMINEE WOULD ADEQUATELY MEET THE ACADEMIC CHALLENGE OF THIS PROGRAM.
4) ❑ THIS NOMINEE WOULD NOT BE AN APPROPRIATE CANDIDATE FOR THIS PROGRAM.

COMMENTS:_____

_____

II. INTEREST

1) ❑ THE NOMINEE HAS THE HIGHEST INTEREST IN SCIENCE AND/OR MATHEMATICS OF ANY STUDENT IN HIS/HER AGE GROUP.
2) ❑ I AM CONVINCED THAT THIS STUDENT IS VERY INTERESTED IN INTELLECTUAL CHALLENGES AND WOULD BE HAPPY TO SPEND FOUR WEEKS IN INTENSIVE STUDY OF THE SUBJECT AREAS OF SCIENCE AND MATHEMATICS.
3) ❑ THIS STUDENT COULD BE PERSUADED TO DEVELOP A STRONG INTEREST IN SCIENCE AND/OR MATH..
4) ❑ I AM NOT CERTAIN THAT THIS STUDENT HAS STRONG ENOUGH INTERESTS IN SCIENCE AND MATHEMATICS TO BE HAPPY IN AN INTENSIVE FOUR WEEK INSTITUTE IN THESE FIELDS.
5) ❑ THIS STUDENT HAS NOT DEMONSTRATED ANY SIGNIFICANT INTEREST IN SCIENCE OR MATH.

COMMENTS:_____

III. ACHIEVEMENT RECORD

1) ❑ THE HIGH SCHOOL ACADEMIC RECORD CLEARLY REFLECTS THE NOMINEE'S ABILITIES AND POTENTIAL.

2) ❑ THE ACADEMIC RECORD DOES NOT TRULY REFLECT THE NOMINEE'S ABILITIES BECAUSE OF THE FOLLOWING:

_____

_____

CHECK THE BOX THAT ACCURATELY DESCRIBES THE NOMINATOR'S PERCEPTION OF THE SKILL LEVEL OF THE STUDENT.

SKILL AREA	AVERAGE UPPER 50%	GOOD UPPER 15%	EXCELLENT UPPER 10%	OUTSTANDING UPPER 5%	SUPERIOR UPPER 3%
ATTITUDE					
VERBAL					
WRITING					
MATH					
MOTIVATION					
LEADERSHIP					
PERSONALITY					
COOPERATION					

ASSESS THE STUDENT'S ABILITY TO GET ALONG IN CLOSE SOCIAL INTERACTIONS, WHETHER THEY BE COMPETITIVE OR COOPERATIVE ENDEAVORS: ❑ GETS ALONG VERY WELL ❑ MODERATELY WELL ❑ WITH DIFFICULTY ❑ NOT WELL ❑ NO KNOWLEDGE

COMMENTS ON INTERACTIONS WITH PEERS AND SCHOOL STAFF:_____

_____

HOW DOES THE NOMINEE RESPOND TO ADULT LEADERSHIP? ❑ HIGHLY POSITIVE AND COOPERATIVE ❑ RECEPTIVE ❑ MODERATELY RECEPTIVE ❑ NOT RECEPTIVE ❑ SOMEWHAT RESENTFUL

INDICATE THE NOMINEE'S EXTRA CURRICULAR ACTIVITIES, AND EXAMPLES OF EXTRAORDINARY LEADERSHIP AND SOCIAL SKILLS (E.G. STUDENT COUNCIL, SCOUTING, CLUBS, COMMUNITY SERVICE, ARTISTIC AND ATHLETIC ACHIEVEMENTS, ETC.).

_____

_____

INDICATE HOW YOU BELIEVE THIS STUDENT IS LIKELY TO BENEFIT FROM AND CONTRIBUTE TO THE GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUTE.

_____

_____

_____

_____

_____

STANDARDIZED TEST INFORMATION (TO BE COMPLETED BY AUTHORIZED SCHOOL PERSONNEL.)

NAME OF STUDENT:_____

GRADE: ❑ SOPHOMORE (10TH) ❑ JUNIOR (11TH) WHAT IS THE STUDENT'S CURRENT GPA? _____/4.00

WHERE DOES THE STUDENT RANK ACADEMICALLY IN HIS/HER CLASS? (IF AN OFFICIAL CLASS RANKING IS CALCULATED, PLEASE SO INDICATE; OTHERWISE, PLEASE OFFER YOUR BEST ESTIMATE.) OFFICIAL RANK:_____ ESTIMATED RANK:_____

PLEASE ATTACH A TRANSCRIPT FOR THE NOMINEE TO THIS FORM.

PLEASE PROVIDE RESULTS OF AT LEAST ONE OF THE FOLLOWING STANDARDIZED TESTS LISTED BELOW. IF THESE ARE NOT AVAILABLE, PLEASE PROVIDE OTHER TEST SCORES OF SIMILAR STATURE. PLACE A CHECK NEXT TO THE TEST BEING REPORTED. BE SURE TO NOTE THE GRADE IN WHICH THE TEST WAS TAKEN.

TEST INSTRUMENT / SUBTEST	RESULTS: SCALE SCORE	RESULTS: PERCENTILE	YEAR
❑ PRELIMINARY AMERICAN COLLEGE TEST (PACT)			_____
❑ AMERICAN COLLEGE TEST (ACT)			_____
ENGLISH	_____	_____	
MATHEMATICS	_____	_____	
READING	_____	_____	
SCIENCE REASONING	_____	_____	
COMPOSITE	_____	_____	
❑ PRELIMINARY SCHOLASTIC APTITUDE TEST (PSAT)			_____
❑ SCHOLASTIC APTITUDE TEST (SAT)			_____
VERBAL	_____	_____	
MATH	_____	_____	
TOTAL	_____	_____	
❑ OTHER TEST INSTRUMENT: _____			_____
_____	_____	_____	
_____	_____	_____	

TO WHAT DEGREE DO YOU FEEL THESE SCORES TRULY REFLECT THE ABILITY AND POTENTIAL OF THIS INDIVIDUAL?

_____

NAME AND TITLE OF PERSON COMPLETING THIS SECTION:_____

_____

SIGNATURE:_____

The George Engelmann Mathematics and Science Institute

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Washington University

University of Missouri - St. Louis

Nomination Form
Application Deadline
March 15, 1993

Please return to:
Dr. Charles R. Granger, Director
The Engelmann Institute
University of Missouri-St. Louis
8001 Natural Bridge Road
St. Louis, MO 63121-4499
(314) 553-6226

University of Missouri St. Louis

THE GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUTE
SCIENCE SCHOLAR PROGRAM
UNIVERSITY OF MISSOURI-ST. LOUIS

STUDENT APPLICATION FORM

ENGELMANN I

APPLICATION DEADLINE MARCH 15, 1993

STUDENT INFORMATION (TO BE COMPLETED BY THE STUDENT.)

STUDENT'S NAME: _____
LAST FIRST MIDDLE

❑ FEMALE ❑ MALE ❑ SOPHOMORE ❑ JUNIOR BIRTH DATE: _____

ETHNIC BACKGROUND: ❑ AFRICAN-AMERICAN ❑ AMERICAN OR ALASKAN NATIVE ❑ ASIAN OR PACIFIC ISLANDER

❑ HISPANIC ❑ WHITE, NON-HISPANIC ❑ OTHER _____

SOCIAL SECURITY NUMBER: _____

NAME(S) OF PARENT(S) OR GUARDIAN(S): _____

HOME ADDRESS: _____ PHONE: _____
STREET CITY ZIP CODE

NAME OF HIGH SCHOOL: _____ PHONE: _____

SCHOOL ADDRESS: _____
STREET CITY ZIP CODE

PRINCIPAL OR CHIEF ADMINISTRATOR: _____

1. INDICATE YOUR CURRENT INTEREST IN SCIENCE AND MATHEMATICS.

   ❑ I AM COMMITTED TO A CAREER IN SCIENCE AND/OR MATH.

   ❑ I AM STRONGLY INTERESTED IN SCIENCE AND/OR MATH.

   ❑ I AM MODERATELY INTERESTED IN SCIENCE AND/OR MATH.

   ❑ I COULD BE CONVINCED TO BE INTERESTED IN SCIENCE AND/OR MATH.

   ❑ I LIKE SCIENCE AND/OR MATH BUT I AM MORE INTERESTED AT THIS TIME IN: _____

   COMMENTS: _____

2. LIST OTHER ACTIVITIES, OUTSIDE OF REGULAR CLASS WORK, THAT REFLECT YOUR INTEREST IN SCIENCE AND MATHEMATICS. INCLUDE SUCH ITEMS AS HOBBIES THAT ARE BASED ON PROBLEM-SOLVING; MATHEMATICS, SCIENCE, COMPUTER PROJECTS; PARTICIPATION IN SCIENCE FAIRS, JSEHS, MJAS, OR JETS; AND BADGES IN 4-H AND SCOUTS; ATTENDANCE AT SCIENCE OR MATH PROGAMS; ETC.:

   _____

   _____

3. WHAT SPECIFIC TOPICS IN SCIENCE/MATH INTEREST YOU? _____

4. WHAT TYPES OF WRITTEN MATERIALS DO YOU READ ON A REGULAR BASIS? _____

   _____

5. HOW DID YOU HEAR ABOUT THE ENGELMANN INSTITUTE? _____

6. Please list all courses completed. Be sure to include courses and grades for 1st and 2nd semesters of the academic year. Please request that your school attach a transcript with the faculty nomination form.

9th Grade			10th Grade			11th Grade		
Course	Semester Grade		Course	Semester Grade		Course	Semester Grade	
	1	2		1	2		1	2

7. What is your overall grade point average in grades 9 through this fall semester?_____/4.00

8. What career(s) are you currently considering? If you have no idea at all about your career choice, write "undecided".

_____

_____

9. To which colleges are you thinking of applying? (List in order of preference). _____

_____

_____

10. How many scientifically oriented papers have you written during your high school experience?

❑ None ❑ 1 ❑ 2-3 ❑ 4-5 ❑ 5 or more

Comments:_____

11. How interested are you in writing research papers?

❑ Not interested ❑ Slightly ❑ Moderately ❑ Very ❑ I love to

Comments:_____

12. What might be the title or subject of a research paper that you would like to write?

_____

_____

13. List the school organizations and activities in which you are involved. Mention any leadership positions that you have held:

_____

_____

14. Describe your involvement in community activities such as scouts, environmental projects, civic activities, or volunteer work:

_____

_____

15. What other activities outside of school do you enjoy? (include sports, hobbies, etc.):

_____

_____

16. List awards, honors or recognitions you have received in and out of school:

_____

_____

17. Do you have any significant medical condition(s) of which the faculty and staff should be aware? ❑ No ❑ Yes

If yes, please describe: _____

18. Will you commit yourself to the necessary time, including some evening hours, needed to satisfactorily participate in all academic and social activities that are part of the four-week program schedule of the Engelmann Institute (June 14-July 9)? ❑ Yes ❑ No Statement of strength of commitment: _____

_____

19. Do you currently hold a job? ❑ No ❑ Yes If yes, with whom?_____

How many hours per week do you work? _____hours.

20. Will you work outside of the home this summer? ❑ No ❑ Yes If yes, how many hours per week do you intend to work? _____hours. With whom?_____

Is the work mandatory for financial reasons? ❑ No ❑ Yes

If yes, how much do you expect to clear this summer? $_____

21. Would your need for a job prevent you from attending the Institute? ❑ No ❑ Yes

22. If you were asked to limit a summer job to no more than 12 hours per week, in order to participate in The Institute, would you be willing to do so? ❑ No ❑ Yes

23. Student Essay:

Write a one page essay on one of the following:

A. Something you feel is of particular importance or significance to society.
B. A particular problem in math or science that you feel needs to be addressed.
C. Your relationship as an individual to society, science and/or technology.

Permission and Commitment/Agreement for the George Engelmann Institute

As parent or guardian of _____, I hereby grant permission for his/her name to be placed in nomination for acceptance to the Engelmann Institute, June 14-July 9, 1993. I also agree to the following pertaining to the above-named student:

1. Permission is given for release of all pertinent school data to the University of Missouri-St. Louis for the purpose of selecting students to attend the Engelmann Institute;

2. I understand that transportation to and from the University of Missouri-St. Louis must be arranged by the student and/or family. I further understand that in case of problems of illness, disruptive behavior, or other unforseen circumstances, I will be responsible for transportation home at any time when Institute officials deem such dismissal necessary for the benefit of the student or others in the Engelmann Institute;

3. I understand that it may be necessary for Institute officials to obtain emergency medical assistance in case of accident or sudden illness. I further understand that, in case of accident or illness, I accept responsiblity for costs of medical care over and above the limited care provided by the Student Health Service. I hereby hold the University and its representatives harmless in the exercise of this authority;

4. If the student is accepted to the Engelmann Institute, we agree to adhere to its rules and regulations concerning students' responsibilities in the academic program. We understand that the director has the right to dismiss any student whose behavior is not consistent with the goals and standards of the Engelmann Institute;

5. I give permission for my student to be taken on field trips, on and off campus, and retain responsibility and liability for their welfare;

6. We agree that the student, if accepted into the Engelmann Institute, will participate in the completion of questionnaires and other appropriate and approved research projects done as part of the program's evaluation. We also agree that photographs of the student taken during the program, papers written by the student during the program, and similar items may be used by the Institute in reports and public information materials. We further agree to allow the Engelmann Institute to release for educational purposes photographs and video recordings, with or without audio, of Institute activities and projects involving the student;

7. We agree that so-called directory information about the student, including student's name and address, school, year in school, and name(s) and address(es) of parent(s) may be released at the discretion of the George Engelmann Institute administrative staff; and

8. We understand that participation in the Engelmann Institute will require a substantial time commitment and are willing to make attendance and full participation a first priority.

Signatures: _____ _____

Parent/Legal Guardian — Date

_____ _____

Student — Date

Without parental/legal guardian consent, this application cannot be processed.

Please return to:

Dr. Charles R. Granger, Director
The Engelmann Institute
University of Missouri-St. Louis
8001 Natural Bridge Road
St. Louis, MO 63121-4499
(314) 553-6226

UNIVERSITY OF MISSOURI-ST. LOUIS

8001 Natural Bridge Road
St. Louis, Missouri 63121-4499
Telephone: (314) 553-6226
Fax: (314) 553-6233

April 9, 1993

2~ 3~ 4~
5~
6~, MO 7~

Dear 2~:

We are pleased to inform you that you have been selected by a panel of ten judges to participate in the 1993 George Engelmann Mathematics and Science Institute Science Scholar Program at the University of Missouri-St. Louis. The Institute will be held June 14-July 9, 1993, with the 5th of July off for the holiday. We have enclosed the proposed summer program for your information and consideration. The first activity of the 1993 Institute will be the Orientation Program for parents, students, and faculty on Sunday, June 13, 1993 at 2:30 p.m. in 104 Stadler Hall at the University of Missouri-St. Louis.

You are one of fifty outstanding St. Louis area high school students selected to participate in this unique program. Upon successful completion of the four-week Science Scholar Program, you will be named an Engelmann Scholar. This recognition is a great honor and will distinguish you among your colleagues.

The 150 applicants represent the very best math and science students within the St. Louis metropolitan area. As a member of the selection committee, we can assure you that every one of the nominees from a total of 70 schools is an outstanding student. We congratulate you on your exceptional academic achievement.

Please complete and return the enclosed acceptance form as soon as possible, but no later than April 16, 1993.

Again, congratulations and best wishes for a productive involvement in the Engelmann Institute. We look forward to meeting and working with you this summer.

Sincerely,

Charles R. Granger
Director, George Engelmann
Mathematics and Science Institute

Pamela L. Iverson
Co-Director, George Engelmann
Mathematics and Science Institute

/nkd

cc: 11~ 12~ 13~

Enclosures

an equal opportunity institution

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GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUTE

SCIENCE SCHOLAR PROGRAM
1993
ADVISORY GROUPS

Red Team	Cradick
Lauren Daniels	Ladue Horton Watkins
Chrissie Eckhoff	McCluer High School
Erica Edwards	Hazelwood East High
Benjamin Elgin	University City High School
Ashleigh Harold	Metro High School
Maitraya Patel	Mary Institute/Country Day
Kevin Ponciroli	DeSmet Jesuit High School
Ted Sanders	Affton High School
Katrina Steiling	Notre Dame High School
Cindy Tochtrop	Grace Christian School
Joshua Trampier	St. John the Baptist
Katherine Werner	Webster Groves High School
Elizabeth Wiggins	Parkway West High School

Yellow Team	Javier
Karen Bliss	Eureka High School
Indraniel Das	Parkway South High School
Tina Fanetti	St. Elizabeth Academy
Aileda Flagg	Rolla High School
Suzanne Friedhoff	Incarnate Word Academy
Jennifer Joerding	Lutheran North High School
Jesse Kharbanda	Parkway West High School
Tiffany Lomax	Central Visual & Perf. Arts
Erin Long	Wright City High School
Ryan McQueen	Lafayette High School
Erik Nolte	St. Louis Priory School
Shannon Patterson	Maplewood-Richmond
Jason Pezold	Lutheran West High School

Blue Team	Kallansrud
Kathryn Bartniczak	Cor Jesu Academy
Christy Collins	McCluer North High School
Chris Hanff	Christian Brothers College
Ryonnel Jackson	Cardinal Ritter College Prep.
Stephen Johannes	Fort Zumwalt North High
Raman Malhotra	Lindbergh High School
Diane Moellenhoff	Lutheran South High School
Carie Mueller	Windsor High School
Narcissa Myrick	Berkeley High School
Jessica Pryor	Central Visual & Perf. Arts
Laura Weiss	Fox High School
Philip Weyman	Kirkwood High School
Jennifer Wilber	Orchard Farm High School

Green Team	Norris
Thomas Ballard	University City High School
David Broyles	Westminster Christian Acad.
Tonya Buckner	Riverview Gardens High
Judy Chen	Parkway Central High
Michelle Dossett	Parkway North High School
Michelle Ernst	Ursuline Academy
Jonathan Feldman	Chaminade College Prep.
Clayton Kennedy	Mehlville High School
Emily Leirer	Grandview High School
Christopher Loving	John Burroughs School
Mike Maniaci	Vianney High School
Kimberly Montgomery	St. Charles West High
Cia-Mattae Sevier	Gateway Institute of Tech.

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THE 1993 GEORGE ENGELMANN MATHEMATICS & SCIENCE INSTITUTE
"Science Scholar Program Participant Summary"

I. School representation = 48

II. Class representation
Sophomore = 29
Junior = 25

III. Gender representation
Male = 22
Female = 32

IV. Ethnic representation
African-American = 8
American or Alaskan Native = 0
Asian or Pacific Islander = 4
Hispanic = 0
White = 42

V. Class Rank of Applicant by Class Size

	Class Size							
	17-99	100-199	200-299	300-399	400-499	500+	No Size Reported	#
Class Rank								
1	4	4	3	4		1	1	17
2	4	2	2	1	1		1	11
3	1	3				1		5
4		1	1		1		1	4
5		2		1				3
6					1			1
7								
8								
9	2	1	1		1			5
10								
11-15				1				1
16-20					1			1
21-25					2			1
25+					1			1
No Rank				1			2	3
	11	13	7	8	8	2	5	54

VI. Grade Point Average

Range	# of Students	cf	c%ile
4.80-4.89	1	1	1.85
4.70-4.79	1	2	3.70
4.60-4.69			
4.50-4.59	2	4	7.41
4.40-4.49	2	6	11.11
4.30-4.39	2	8	14.52
4.20-4.29	4	12	22.22
4.10-4.19	4	16	29.63
4.00-4.09	18	34	62.96
3.90-3.99	8	42	77.77
3.80-3.89	6	48	88.88
3.70-3.79	1	49	90.74
3.60-3.69			
3.50-3.59	2	51	94.44
Below 3.50	2	53	98.15
Not Reported	1	54	100.00
	54	54	100.00

VII. Standardized Test Scores (1)

Range	Verbal Test Scores f	cf	cf%	Math Test Scores f	cf	cf%
99-98%ile	21	21	38.88	24	24	44.44
97-96%ile	6	27	50.00	5	29	53.70
95-94%ile	6	33	61.11	6	35	64.81
93-92%ile	2	35	64.82	1	36	66.66
91-90%ile	3	38	70.37	1	37	68.52
89-88%ile	2	40	74.07	4	41	75.93
87-86%ile	1	41	75.93	3	44	81.48
85-84%ile				1	45	83.33
83-82%ile				1	46	85.18
81-80%ile	4	45	83.33	1	47	87.04
79-78%ile				2	49	90.74
77-76%ile	1	46	85.18			
75-74%ile				1	50	92.57
Below 73%ile	5	51	94.44	1	51	94.44
Not reported	3	54	100.00	3	54	100.00
	54	54	100.00	54	54	100.00

(1) Denotes aggregate ACT, DAT, MMAT, PACT, PLAN, PSAT, SAT, SCAT

University of Missouri St. Louis

GEORGE ENGELMANN

MATHEMATICS & SCIENCE INSTITUTE

1993
Orientation

Advisory Committee

High School Representatives

Mr. Tom Cradick ..... Parkway North High School
Mr. Tony Kardis ..... Ladue Horton Watkins High School
Ms. Karen Tichy ..... Catholic Education Office
Mr. Tom Yager ..... John Burroughs School

Corporate and Community Representatives

Mr. Elmer Boehm ..... Monsanto Corporation (retired)
Mr. Mark Botterman ..... Emerson Electric Company
Mr. Larry Carp ..... Carp, Sexauer and Carr Attorneys
Mr. James McGarry, Jr. ..... McDonnell Douglas Corporation
Dr. Paul Markovits ..... Math and Science Education Center
Mr. Ken Sowell ..... St. Louis Science Center
Mr. Ned Siegel ..... Monsanto Company
Mr. Bruce Smith ..... Normandy School District
Dr. Seenu Srinivasen ..... Mallinckrodt Inc.
Dr. Carl Tenpas ..... CaChe Scientific
Mr. George Tomazi ..... Mallinckrodt
Mr. George Willson ..... A.P. & J.B. Green Foundation

University Representatives

Dr. James Bundschuh ..... St. Louis University
Dr. Bernard Feldman ..... Department of Physics
Dr. Rick George ..... Dean, School of Education
Dr. Sandra Gottfried ..... Departments of Biology and Educational Studies
Dr. James O'Brien ..... Department of Chemistry
Dr. Wendell Smith, ... Dean, Continuing Education and Outreach

Englemann Scholar Representatives

Ms. Quiana Cope ..... Ladue Horton Watkins High School
Mr. Damon Vincent ..... Washington University

Institute Administration

Dr. Blanche M. Touhill ..... Chancellor
Dr. E. Terrence Jones ..... Dean, College of Arts and Sciences
Dr. Rick George ..... Dean, School of Education
Dr. Charles R. Granger ..... Director
Dr. Teresa Thiel ..... Co-Director, Scholar Research Program
Ms. Pamela L. Iverson ..... Co-Director
Dr. Kenneth R. Mares ..... Associate Director
Ms. Nancy Diley ..... Administrative Aide
Ms. Judy Leonard ..... Interim Coordinator

University of Missouri-St. Louis
George Engelmann Mathematics & Science Institute
Orientation Program

June 13, 1993

Welcome	Dr. Roosevelt Wright Jr. Vice Chancellor for Academic Affairs University of Missouri-St. Louis
Greetings	Dr. Rick George Dean, School of Education University of Missouri-St. Louis
The George Engelmann Institute: Curriculum Overview	Dr. Charles R. Granger Professor Departments of Biology and Educational Studies University of Missouri-St. Louis
Recollections by	George Engelmann, M.D. (1809-1884) with Dr. Steven Rowen Professor of History University of Missouri-St. Louis
Reception	Research Atrium

Sponsors

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GTE Telephone Operations
American Institute of Chemical Engineers
Worldwide Insurance Group
Medicine Shoppe
International Inc.
St. Louis University
Washington University
University of Missouri-St. Louis

Mentor Faculty

Mr. Tom Cradick, Parkway North High School
Ms. Kelly Javier, St. John's Prep High School
Mr. Gary Kallansrud, Parkway West High School
Mr. Tony Kardis, Ladue Horton Watkins High School
Ms. Ellen Norris, Christian Brothers College High School

Engelmann Science Scholar Program
Faculty

Dr. Lawrence Barton
Dr. Shirley Bissen
Dr. John Boswell
Dr. Jerry Bryant
Ms. Linda d'Avignon
Dr. Larry DeBuhr
Ms. Linda Duke
Dr. Bernard Feldman
Mr. Chris Flores
Dr. Phil Fraundorf
Dr. Harvey Friedman
Mr. John Fuller
Mr. Wayne Garver
Mr. Tim Giblin
Dr. Charles Granger
Mr. David Griesedieck
Dr. James Hunt
Dr. Jacob Leventhal
Dr. Terry Martin
Ms. Kathi McDonald
Mr. James McGarry, Jr.
Dr. Robert Murray
Mr. Michael Sampson
Dr. Alan Schwartz
Dr. Richard Schwartz
Mr. Ned Siegel
Ms. Denise Silvester
Dr. Teresa Thiel
Dr. Bruce Wilking

Engelmann Scholar Research Program
Faculty

Dr. Robert Aldridge*
Dr. Charles Armbruster
Dr. Richard Axelbaum***
Dr. Lawrence Barton
Dr. Carl Bassi**
Dr. Cliff Belone
Dr. Shirley Bissen
Dr. Robert Bolla*
Dr. John Boswell**
Dr. William Connett**
Ms. Linda d'Avignon
Dr. Dorothy Feir*
Dr. Bernard Feldman**
Dr. Eugene Fox
Dr. Phil Fraundorf**
Mr. John Fuller
Mr. Tim Giblin
Dr. Charles Granger**
Dr. Michael Green*
Dr. David Griesedieck
Dr. Richard Grodsky***
Dr. Harold Harris**
Dr. Wesley Harris**
Dr. Bamin Khomami***
Dr. Robert Kranz***
Dr. Stan Kwasny***
Dr. David Lagunoff*
Dr. Jay Lee
Dr. Stephen Lehmkuhle**
Dr. Jacob Leventhal**
Dr. Ronald Loui***
Dr. Terry Martin
Dr. Robert Marquis
Mr. James McGarry, Jr.
Dr. James Miller
Dr. James O'Brien**
Dr. Miles Patterson**
Dr. Nigam Rath**
Dr. William Richard***
Dr. James Riehl**
Dr. David Russell**
Dr. Alan Schwartz**
Dr. Michael Sesma**
Dr. Donald Snyder***
Dr. John Stern***
Dr. Zuleyma Tang-Martinez
Dr. George Taylor**
Dr. Teresa Thiel**
Dr. Vetta Sanders Thompson**
Dr. Clifford Will
Dr. Michael Wysession

Research Mentors:

*St. Louis University **University of Missouri-St. Louis ***Washington University

93416B-693

The George Engelmann Mathematics and Science Institute

Specific Objectives

The Specific Objectives of The George Engelmann Mathematics and Science Institute are to:

- Enhance student knowledge of current topics in biology, chemistry, mathematics, physics, psychology and related technical fields;
- Provide an understanding of the philosophy of science and the total scientific enterprise;
- Introduce students to the theory and application of statistical analysis;
- Instruct students in technical writing, the presentation of formal scientific papers, and the skills of oral presentation of papers;
- Provide opportunities for students to use technical equipment and practice laboratory techniques in an open-ended, problem solving setting;
- Require participation in the exploration of one or more scientific problems;
- Provide support for the continued work on independent student research projects;
- Provide opportunities for the integration and reinforcement from peers of similar interests and goals;
- Introduce students to a wide variety of career opportunities in science and technology; and
- Provide an academic framework in which to integrate the science, mathematics, technology; art, humanities, and the athletic component of the human experience.

THE GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUTE

SCIENCE SCHOLAR PROGRAM

"UNIFYING CONCEPTS IN SCIENCE"

June 14 - July 9, 1993

PROGRAM

Week 1 (June 14-June 18, 1993)

TIME	DAY				
	Monday 14	Tuesday 15	Wednesday 16	Thursday 17	Friday 18
7:30			ID Photos, Woods		
8:00	Welcome 104 Stadler	Advisory 101, 104, 115, and 116 Benton 101 - Green 104 - Blue 115 - Yellow 116 - Red	Advisory 101, 104, 115, and 116 Benton	Group Advisory T. Kardis & Mentors 104 Benton	Advisory 101, 104, 115, and 116 Benton NEWSPAPER DUE Cradick Group
8:10	Orientation 104 Stadler				
8:30	Assessment Session 104 Stadler	Biochemistry Laboratory, Mentors 245 Stadler	Digital Thought and Action, W. Garver 336 Benton	Biochemistry Laboratory, Mentors 245 Stadler	Basics of Technical Writing, Dr. Martin 445 Benton
9:30	Digital Thought and Action, W. Garver 336 Benton				
10:00					Library Workshop & Scavenger Hunt, Library L. D'Avignon
11:00		Philosophy of Science, Prof. Griesedieck 445 Benton	Philosophy of Science, Prof. Griesedieck 445 Benton	Philosophy of Science, Prof. Griesedieck 445 Benton	
12:00	Lunch Provided with Prof. Griesedieck Intro. to Philosphy of Science Hawthorn Room	Lunch in Hawthorn Room Bring or Buy	Lunch Provided Career Confab Prof. L. Barton Hawthorn Room	Lunch in Hawthorn Room Bring or Buy	Bus Leaves for Sigma Chemical Company Field Trip Lunch Provided by Sigma
12:45	Orientation to Science Departments	Variation and Uncertainty in Nature, Prof. Boswell 104 CCB	Variation and Uncertainty in Nature, Prof. Boswell 104 CCB	Variation and Uncertainty in Nature, Prof. Boswell 104 CCB	
1:50		Science Seminar Series: Basic Biochemistry, Prof. Bryant 120 Research	Science Seminar Series: Immune Response, Prof. Friedman 120 Research	Science Seminar Series: AIDS, Prof. Friedman 120 Research	
2:50	Basics of Volleyball, D. Silvester L. Duke	Basics of Softball, D. Silvester L. Duke	Practice Game, D. Silvester L. Duke	Round Robin, D. Silvester L. Duke	
4:00	Adjournment	Adjournment	Adjournment		Adjournment
4:15			Mentor's Meeting 227 Research (No Students)		
4:30				Picnic at Shaw Park	
8:00				Adjournment	

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THE GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUTE

SCIENCE SCHOLAR PROGRAM

"UNIFYING CONCEPTS IN SCIENCE"

PROGRAM CONTINUED

Week 2 (June 21-June 25, 1993)

TIME	DAY				
	Monday 21	Tuesday 22	Wednesday 23	Thursday 24	Friday 25
8:00	Advisory 101, 104, 115, and 116 Benton	Advisory 101, 104, 115, and 116 Benton	Advisory 101, 104, 115, and 116 Benton VISITATION DAY PAPER TOPIC AND SOURCES DUE	Advisory 101, 104, 115, and 116 Benton	Advisory 101, 104, 115, and 116 Benton NEWSPAPER DUE Javier Group
8:30	Digital Thought and Action, W. Garver <-> 336 Benton	Library with Mentors Library	Digital Thought and Action, W. Garver <-> 336 Benton	Molecular Biology Laboratory, N. Siegel 245 Stadler	Digital Thought and Action, W. Garver <-> 336 Benton
11:00	Basics of Technical Writing, Dr. Martin 121 Research	Philosophy of Science, Prof. Griesedieck 121 Research	Philosophy of Science, Prof. Griesedieck 121 Research	Philosophy of Science, Prof. Griesedieck 121 Research	Philosophy of Science, Prof. Griesedieck 121 Research
11:45					Bus Leaves for Monsanto Company Field Trip, N. Siegel Lunch provided by Monsanto Company
12:00	Lunch Provided Career Confab, Prof. S. Bissen, Hawthorn Room	Lunch in Hawthorn Room Bring or Buy	Lunch Provided Career Confab John Fuller, KSDK Hawthorn Room	Lunch in Hawthorn Room Bring or Buy	
12:45	Variation and Uncertainty in Nature, Prof. Boswell 104 CCB	Variation and Uncertainty in Nature, Prof. Boswell 104 CCB	Variation and Uncertainty in Nature, Prof. Boswell 104 CCB	Variation and Uncertainty in Nature, Prof. Boswell 104 CCB	
1:50	Science Seminar Series: Biotechnology, Prof. Bryant 120 Research	Science Seminar Series: Genetic Engineering, Prof. Bryant 120 Research	Science Seminar Series: Herbig-Haro Objects; Hubble Space Telescope, Prof. R. Schwartz 120 Research	Science Seminar Series: Starbirth and Formation of the Solar System, Prof. Wilking, 120 Research	
2:50	Softball Round Robin, D. Silvester L. Duke	Softball Round Robin, D. Silvester L. Duke	Volleyball Round Robin, D. Silvester L. Duke	Volleyball Round Robin, D. Silvester L. Duke	
4:00	Adjournment	Adjournment	Adjournment	Adjournment	
4:15			Mentor's Meeting 227 Research (No Students)		
5:00					Adjournment
7:30		Planetarium/ Observatory, T. Giblin			
10:00		Adjournment			

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THE GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUTE

SCIENCE SCHOLAR PROGRAM

"UNIFYING CONCEPTS IN SCIENCE"

PROGRAM CONTINUED

Week 3 (June 28-July 2, 1993)

TIME	DAY				
	Monday 28	Tuesday 29	Wednesday 30	Thursday 1	Friday 2
8:00	Advisory 101, 104, 115, and 116 Benton PAPER OUTLINE DUE	Advisory 101, 104, 115, and 116 Benton	Advisory 101, 104, 115, and 116 Benton ROUGH DRAFT OF INTRO. TO PAPER DUE	Advisory 101, 104, 115, and 116 Benton	Commencement Rehersal during Advisory 101,104, 115 and 116 Benton NEWSPAPER DUE Norris Group ROUGH DRAFT OF PAPER DUE
8:30	Laser Physics Laboratory, Prof. Feldman 328 Benton	Digital Thought and Action, W. Garver 336 Benton	Laser Physics Laboratory, Prof. Fraundorf 328 Benton	Basics of Technical Writing, Dr. Martin 445 Benton	Digital Thought and Action, W. Garver 336 Benton
11:00	Theory & Thought in Mathematics, Prof. A. Schwartz 445 Benton	Theory & Thought in Mathematics, Prof. A. Schwartz 445 Benton	Theory & Thought in Mathematics, Prof. A. Schwartz 445 Benton	Science Seminar Series: "Particles Smarticles?" Prof. C. Granger 445 Benton	Philosophy of Science, Prof. Griesedieck 445 Benton
12:00	Lunch Provided with Prof. J. Leventhal, Hawthorn Room	Lunch in Hawthorn Room Bring or Buy	Lunch in Hawthorn Room Bring or Buy	Bus Leaves for McDonnell Douglas Bring Sack Lunch to Eat on Bus	Lunch Provided Career Confab Hawthorn Room
12:45	Variation and Uncertainty in Nature, Prof. Boswell 104 CCB	Variation and Uncertainty in Nature, Prof. Boswell 104 CCB	What is E-II? Prof. T. Thiel 120 Research		Variation and Uncertainty in Nature, Prof. Boswell 104 CCB
1:00			Seminar: How to Write a Resume, Deborah Kettler 120 Research	McDonnell Douglas Field Trip J. McGarry	
1:50	Science Seminar Series: Cold Fusion, Prof. Feldman 120 Research	Science Seminar Series: Theory and Thought in Mathematics, Prof. A. Schwartz 120 Research	Paper Preparation and Research		Basics of Oral Presentation, K. McDonald and M. Sampson 120 Research
2:50	Volleyball Round Robin, D. Silvester L. Duke	Volleyball Round Robin, D. Silvester L. Duke			Science Seminar Series: Populations, Prof. J. Hunt 120 Research
4:00	Bus Leaves for Union Station Bring Money for Dinner	Adjournment	Adjournment	Adjournment	Adjournment
7:30	Baseball Night Cards vs. Phillies				
10:30	Adjournment				

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THE GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUTE

SCIENCE SCHOLAR PROGRAM

"UNIFYING CONCEPTS IN SCIENCE"

PROGRAM CONTINUED

Week 4 (July 5-July 9, 1993)

TIME	DAY				
	Monday 5	Tuesday 6	Wednesday 7	Thursday 8	Friday 9
8:00	Independence Day Break	Advisory 101, 104, 115, and 116 Benton	Advisory 101, 104, 115, and 116 Benton	Advisory 101, 104, 115, and 116 Benton FINAL PAPER DUE	Group Presentations Concurrent Sessions 120 & 121 Research NEWSPAPER DUE Kallansrud Group
8:30		Population Biology Laboratory, Prof. J. Hunt/Flores 245 Stadler	Digital Thought and Action, W. Garver 336 Benton	Population Biology Laboratory, Prof. J. Hunt/Flores 245 Stadler	
11:00		Philosophy of Science, Prof. Griesedieck 445 Benton	Philosophy of Science, Prof. Griesedieck 445 Benton	Philosophy of Science, Prof. Griesedieck 445 Benton	
12:00		Lunch in Hawthorn Room Bring or Buy	Lunch Provided with Prof. R. Murray Hawthorn Room	Lunch in Hawthorn Room Bring or Buy	Lunch Provided Hawthorn Room
12:45		Variation and Uncertainty in Nature, Prof. Boswell 120 Research	Variation and Uncertainty in Nature, Prof. Boswell 120 Research	Assessment Session 120 Research	Group Presentations Concurrent Sessions 120 & 121 Research
1:50		Project Preparation Dr. Martin, K. McDonald and M. Sampson 120 Research	Science Seminar Series: Prof. J. Hunt 120 Research	Missouri Botanical Garden Research Field Trip, Dr. L. DeBuhr	
2:30					Engelmann Scholar Confirmation Ceremony Commencement Challenge Presentation and Reception 104 Stadler
2:50		Science Seminar Series: Ecosystems, Prof. J. Hunt 120 Research	Project Preparation Library		
4:00		Faculty Challenges Students at Softball	Adjournment		
4:15					Adjournment
6:00		Pool & Pizza Party UMSL Honors College		Adjournment	
9:00		Adjournment			

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THE GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUTE
Science Scholar Program

Definition of Activities

Welcome: Appropriate staff welcome students to summer program.

Orientation: Definition and outline of summer science program.

Assessment Session: Pre- and Post-testing to determine significant gain in subject matter information and attitude change.

Digital Thought and Action (Systems Design): Hands-on laboratory involving basic circuit design and utilization. Offered every other day for half of the participants. Alternates with laboratory.

Campus Science Tour: Open house opportunities for students to visit the Departments of Biology, Chemistry, Psychology, and Physics.

Advisory: Advisory and discussion time with teacher mentors.

Philosophy of Science: A mini-course on the history and development of scientific thought. The process of seeking truth.

Laboratory (Varied Subjects): Hands-on experiences illustrating concepts, techniques and mental processes associated with topics in Science Seminar Series. Offered every other day for half of the participants. Alternates with Digital Thought and Action.

Variation and Uncertainty in Nature: A mini-course in statistical analysis and experimental design. Consideration of the definition of scientific "truth."

Science Seminar Series: A lecture Series of specific, related, and timely topics in science.

Basics of Softball (Volleyball): Introduction to the kinesiology and basic strategies of two common sports. Guidance and instruction in a simple competitive setting.

Career Confab: Lunch time informal discussion or audio-visual presentations on careers relating to topics in Science Seminar Series.

Basics of Technical Writing: Presentations discussing and illustrating techniques of scientific writing.

Library Workshop: Hands-on workshop illustrating the operation of Thomas Jefferson Library facilities including computer search.

Search Resources: Discussion of reference materials and research tools available to students on the UM-St. Louis campus.

Named Field Trips: An applied, career-focus experience to culminate a specific Science Seminar Series of presentations.

Visitation Day: An open house where parents, guardians, teacher counselors, friends of Institute participants can visit classes and other activities.

Essentials of Oral Presentation: A how-to-do-it discussion on the mechanism of constructing and delivering a scientific paper.

Lunch on Your Own: Bring your own brown bag or cash for cafeteria service.

Lunch with...: An informal discussion of the research interests and professional goals of Science researchers.

Theory and Thought in Mathematics: A series of lectures discussing the philosophy of mathematics, problem solving strategies, and challenges in the study of mathematics.

Project Presentations: Oral presentations of student research papers before peers, teachers, and parents.

Challenge Presentation: The final presentation that ties the experiences of the Institute with the challenges facing humanity.

Engelmann's Notebook

The Green Gazette

Engelmann Visits Union Station

Last Monday, students from both Engelmann I and Engelmann II traveled to Union Station. We stayed there for an hour before leaving for the Cardinal baseball game. Most ate dinner at various locations throughout Union Station. They then wandered around, visiting various stores, while they were waiting for the hour to end. A few tried the virtual reality machines in Virtuality. Others just walked around for a while. At the end of the hour, everyone boarded the buses in heavy rain and headed for Busch Stadium. In the end, a good time was had by all.

Engelmann Blues

By: Cia - Mattae Sevier

It's 6:00 in the morning. My alarm is steadily ringing---to no avail, and I can't seem to get out of bed. Just because I didn't go to bed until one o'clock in the morning is no good reason for me not to get up, right? If I recall, the previous day ended at the ballpark. However, I'd rather not discuss that issue.....fumes from the buses, nausea, screaming---O.K.! So, I finally dragged myself out of bed. A good shower, some breakfast, and a little music should wake me up(NOT);I feel like I'm on Planet X. Anyway, the ride to school is manageable. It's the only time I can fully relax, or catch up on some sleep before the day really starts.

When I get to school, I find my classroom deserted (I figure everyone feels just as out of it as me). Sooner or later, preferably later, in comes the rest of the class and Mrs. Norris. Then we precede to take care of business. Frankly, I think everyone knows how the rest of the day goes-- -- from caffeine drives in the seminars to dehydration on the softball and volleyball fields. Therefore, I'm going to help myself out by getting some rest. Maybe tomorrow, I'll experience a different kind of day.....hopefully!

Carefully Planned Prof. Jacob Leventhal

by Judy Chen

Prof. Jacob Leventhal is a physicist as well as a lover of sports, particularly football and baseball. His entertaining lecture at lunch incorporated topics such as his spontaneous college life where he had initially hoped to play football

and see his name in the Hall of Fame. Unfortunately, due to an injury, he was unable to fulfill his dream and therefore took classes in physics. He then applied to graduate schools in the states of Florida and Hawaii. He eventually went to school in Florida where he took and past his Ph.D. qualifier. With the Ph.D. in a subject he initially did not care to pursue, he took on the profession of teaching and researching at the University of Missouri in St. Louis. At lunch, he referred often to his sons, one of which is pursuing a career in physics. That, Prof. Leventhal believes, is a mistake. Throughout Prof. Leventhal ear-catching discussion mixed with a few outstanding phrases, physics and baseball (and football) were many interesting and prominent topics.

Untitled

By: Tonya Buckner

These four weeks are tough,
Adjusting to new ways of
thinking, new friends, and a
new environment.
Pressure is coming down on
us, and sometimes we feel as
if we are losing the fight.
We may our best to fit
in, but we just can't all of
the time.
We may feel different than others,
embarrassed each day,
wondering what the other kids
will think of our intelligence
or what we say.
But we don't have to worry,
because we can makĕ it through.
Just remember, it will all
be over soon.
Our papers will be done, and
We'll be singing a happy tune!

Marvelous Magical Merriment at Monsanto

By: David Broyles

On Friday, June 25, 1993, Engelmann I students visited the Monsanto branch located on Chesterfield Parkway, off Olive. when they arrived, the students plowed into the many pizzas that Monsanto had waiting.

Afterwards, a presentation was given that included information on Roundup and AIDS research. Then, everyone was able to see the results of their lab experiments. They oohhed and aahhed when they saw their blue and white speckled dishes, but almost lost their recently eaten lunch when they smelled them. Before they could recover from their nauseating encounter, half the people were split up to go on a tour, while the others spent time at various stations to learn about Monsanto projects.

the tour was very tourish. The tourees were shown the many levels of a new 150 million dollar building. The top floor housed green houses, where tomatoes, soy beans, and corn were grown. Further down there were weather controlled climate rooms where scientists could order whatever formula of soil they needed. The tour leader told the students that "the soil won't be recycled. It is too expensive to recycle, so we give it to people. Otherwise it goes to a landfill... Otherwise it goes to a

landfill." When the touring students returned, they participated in a couple of stations/labs that included Roundup displays, shooting DNA into leaves, and culturing plants from the genes instead of the seeds.

At the end, the students bid a fond farewell to Monsanto and headed back on the LONG bus ride back to UMSL...

Who Are They?

By: Tonya Buckner

Whenever you are feeling too much pressure,
They are there to help and encourage you.
When you don't have an idea what the lab is about,
they will carefully explain it to you.
And when you are feeling confused or misunderstood,
They try always to understand.
If you ever say the words "I can't,"
they will they you that you can.
They have helped us so much, and are deserving of lots of credit,
and have also displayed honor, care, and merit.
Who are they? Of course, our Mentors!

Horrorscopes

Aries (March 21 - April 19) A slip at your doctor's office leads to your being prescribed a powerful growth hormone. Chance of fulfilling childhood dream of becoming basketball star/circus freak imminent.

Taurus (April 20 - May 20) Beware of falling pianos.

Gemini (May 21 - June 21) If you ever want to see your mother again bring $50,000 in small unmarked bills to dock 17, on the landing by midnight. Come alone.

Cancer (June 21 - July 22) You will meet a tall, dark, and handsome stranger, dressed in blue, likely a federal employee, who will solve your short term housing needs. You have one week to get your affairs in order.

Leo (July 23 - Aug. 22) Look for love in strange places. Emphasis on your couch cushions. You will meet an old friend who will need bail money.

Virgo (Aug. 23 - Seeped 22) Remember: The pelican sits on the post by the sea, facing west, and stares in the wind, by the light of a burning camel. The nuns with umbrellas eat Cadilacs without changing their socks. This may be useful someday.

Libra (Sept. 23 - Oct. 22) Romantic candlelight dinner goes awry. Stock up on medical supplies, especially tape, gauze, and burn ointment.

Scorpio (Oct. 23 - Nov. 21) The swallows will return from their migration in Capistrano, and will take up residence in your hair.

Sagittarius (Nov. 22 - Dec. 21) Read and obey the warning labels on all your household appliances. Avoid the refrigerator at all costs.

Capricorn (Dec. 22 - Jan. 19) You will discover that the shirt you plan on wearing to that big event tonight has mysteriously shrunk. Emphasis on inhalation.

Aquarius (Jan. 20 - Feb. 18) A large crack will develop in your foundation, allowing a swarm of tropical insects to take over your home. Patch up relationship with friends having spare rooms.

Pisces (Feb. 19 - March 20) You will be mortally embarrassed when you next go to a Chinese restaurant, when you roll up the table cloth and smoke it.

The Giants surprise other teams - 'Unbelievable' says one stunned Rebel

The third week of Engelmann was filled with surprise for many of the teams, as the Green Team, after suffering some harsh luck in the first two weeks, managed to drive fear into the hearts of its opponents, who had previously thought they were no one to be wary of. First to discover the hidden prowess of the Green Giants were the Yellow Rebels. After losing to the Rebels in the first set of volleyball, the Giants savagely drew their revenge the next set, starting off with ace server Michelle Ernst, who promptly gave the Giants a 11-0 lead. The Giants would then put together a marvelous team effort to continue the shutout and won 15-0. The first victory stirred adrenalin in the Giants, who began the next game with an 8-5 lead before it was called due to rain.

The next team to unwillingly discover the Giants' long-dormant athletic prowess were the Blue Genes. The Giants' played almost supernaturally, with superb success in all facets of their game with the entire team pitching in. Exceptional contributors were Jon F., Mike M., Emily L., Judy C., Clay K., Kim M., Dave B., Chris L., Michelle D., Shelley E., Tom B., Cia-Mattae S., and Tonya B. As the flabbergasted Genes gawked at the athletic marvel they saw before them, the Giants quickly triumphed with a 11-6 win. The blue team then squeaked by with a 12-10 victory, but the Giants had beaten them in total points, and hurt them in the standings.

Monday again pitted green vs. yellow. While the yellow team was fighting for first place, the Giants were inspired by heart-felt pride. After excellent play by both teams, the score remained tied at 9. Finally, after a very controversial side-out call, the yellow team won 11-9. But the Giants had earned the respect they deserved.

On Tuesday the yellow and green again met, this time on the softball field. Although the Rebels were prepared for the Giants' abilities, nothing, it seemed, could stop the Green gang's onslaught. As a stunned Ryan McQueen said after the game, "It was unbelievable. We tried everything to stop them, but they just kept coming. It was very impressive. Although they struggled early on in Engelmann, I would say they're the best team right now." The Rebels played their hearts out. Home runs by Erik Nolte and

Ryan McQueen kept them close, but in the end the ubiquitous offensive attack and iron curtain defense of the Giants overwhelmed them, and the Green team won, 8-7. This news was sweet for the blue team, who had beaten the red team in volleyball on the same day. Their victory, along with the Rebel's loss, perhaps pushed the Genes into sole possession of first place. The standings now, unofficially, are:

BLUE GENES
RED HOT CHILI PEPPERS
YELLOW REBELS
GREEN GIANTS

It is important, however, to remember Mr. McQeen's quote when looking at these standings. The best team may not be the one with the best record.

All competition aside, it is important to emphasize how helpful and entertaining the sports were during Engelmann. They provided a brief yet meaningful respite between lectures and homework, and provided opportunities for some students who do not normally play athletics to do so. Their inclusion in the schedule was a wise move on the part of the directors.

Personals

SWM 37, seeks WWF, 80+, w/ lots of family money to leave me a large inheritance
Box: QS321

SWM 17, Nice guy, having a 'bad hair life' seeks SFW with good tiller. Send photo of tiller.
Box: TI423

SWF 23, Looking for that special someone to go slam ballet dancing with, if you like Spam, paperclips, and dressing up like a farm animal, give me a try.
Box: HO432

SWM, 16, seeking anyone who understands Boswell's class.
Box: ΣM432

SBM, 35, successful, into classic cars and Italian food. Looking for Carmen Sandiego
Box: DS321

SWF, 18, I'm looking for that special person, dressed in red and white stripes, with glasses and a hat. A magician and a scroll would be nice too!
Box: WA232

A Treatise on the Life of an Engelmann Scholar

By Erik "Shakespeare's Brother" Nolte

This was left out of last week's issue. It does not express the views of the wonderful Green Team.

We run here and there
Across UMSL square,
Scribbling notes on our pads.

And on parents' day,
The mentors all say,
We'll be dragging our moms and dads.

To Sigma we went,
A Friday we spent,
With a lunch that was nearly gourmet.

Light from crushed fireflies
Did dazzle our eyes
At the end of our int'resting stay.

We jump for the ball
And oft times watch it fall
For a home run or sideout or ace.

The other teams try,
But on gameday they die,
With the Yellow team right in their face.

Deadlines draw near,
Bringing anguish and fear,
We'll be up late many a night.

But with expert advice
From mentors so nice
The papers will all come out right.

Engelmann, Engelmann,
What rhymes with Engelmann?
A challenge for you, Doctor Granger!

A topic is needed,
Our thoughts are impeded,
That's it! Writer's block and its relationship with asphyxia.
(Close enough.)

Nevermore
Stolen from the UNI Comedy conference...
And brought to you by David Broyles

Once upon a midnight dreary, fingers cramped and vision bleary,
System manuals piled high and wasted paper on the floor,
Longing for the warmth of bedsheets,
Still I sat there, doing spreadsheets;
Having reached the bottom line
I took a floppy from the drawer.
Typing with a steady hand, I then invoked the SAVE command
But I got a reprimand: it read Abort, Retry, Ignore.

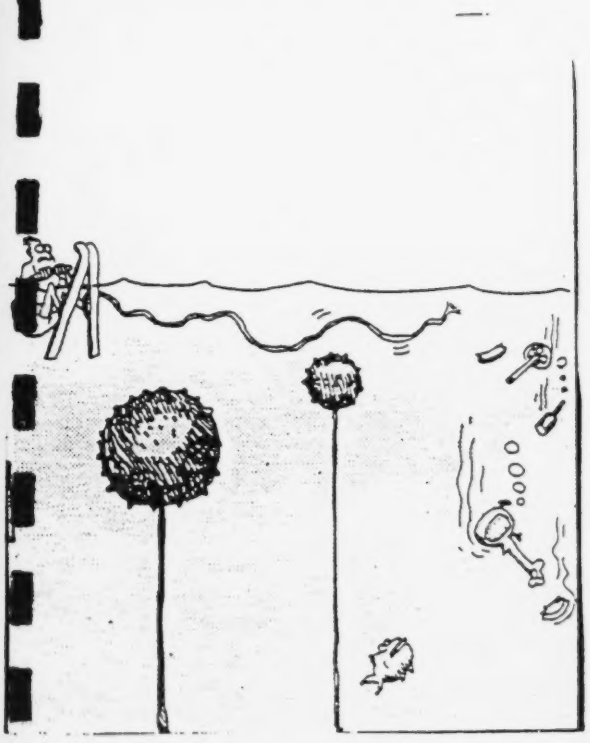
These were choices Solomon himself had never faced before.
Carefully, I weighed my options,
these three seemed to be the top ones,
clearly I must now adopt one:
Choose Abort, Retry, Ignore.

With my fingers pale and trembling,
Slowly toward the keyboard bending,
Longing for a happy ending, hoping all would be restored,
Praying for some guarantee
Finally I depressed a key--
But on the screen what did I see?
Again: Abort, Retry, Ignore.

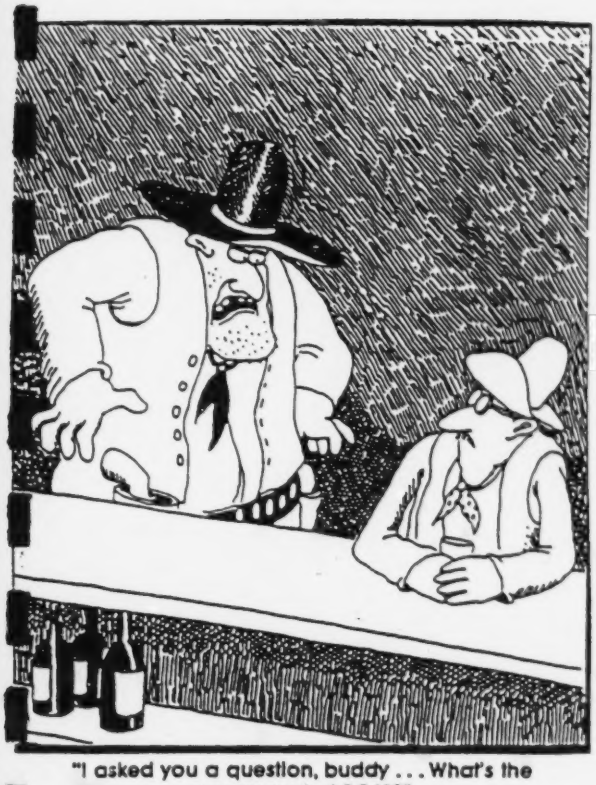
I tried to catch the chips off-guard--
I pressed again, but twice as hard.
Luck was just not in the cards.
I saw what I had seen before.
Now I typed in desperation
Trying random combinations
Still there came the incantation:
Abort, Retry, Ignore.

There I sat, distraught exhausted, by my own machine accosted,
Getting up I turned away and paced across the office floor.
And then I saw an awful sight:
A bold and blinding flash of light--
A lightning bolt had cut the night and shook me to my very core.
I saw the screen collapse and die
"Oh no--my database," I cried.
I though I heard a voice reply,
"You'll see your data Nevermore!"

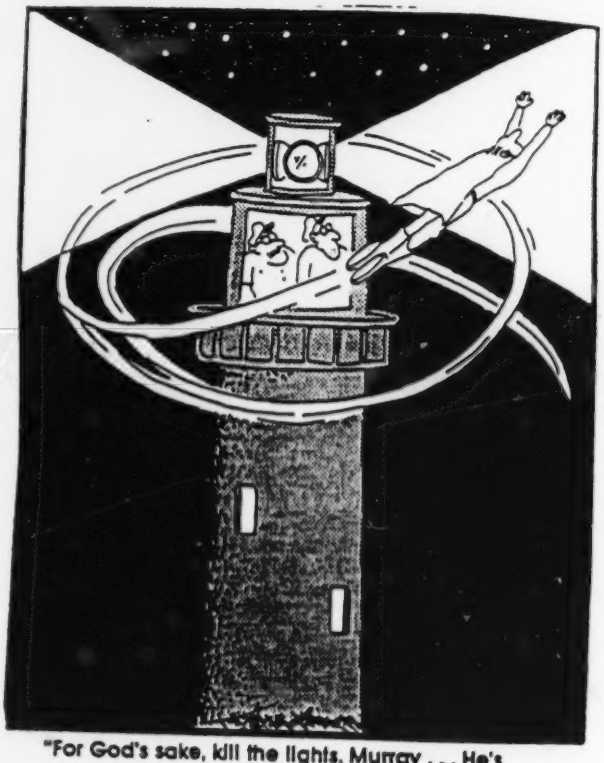
To this day I do not know
The place to which lost data goes.
I bet it goes to heaven where the angels have it stored.
But as for productivity, well
I fear that IT goes straight to hell
And that's the tale I have to tell
Your choice: Abort, Retry, Ignore.



"Look . . . You wanna try putting him back together again?"



"I asked you a question, buddy . . . What's the square root of 5,248?"



"For God's sake, kill the lights, Murray . . . He's back again!"

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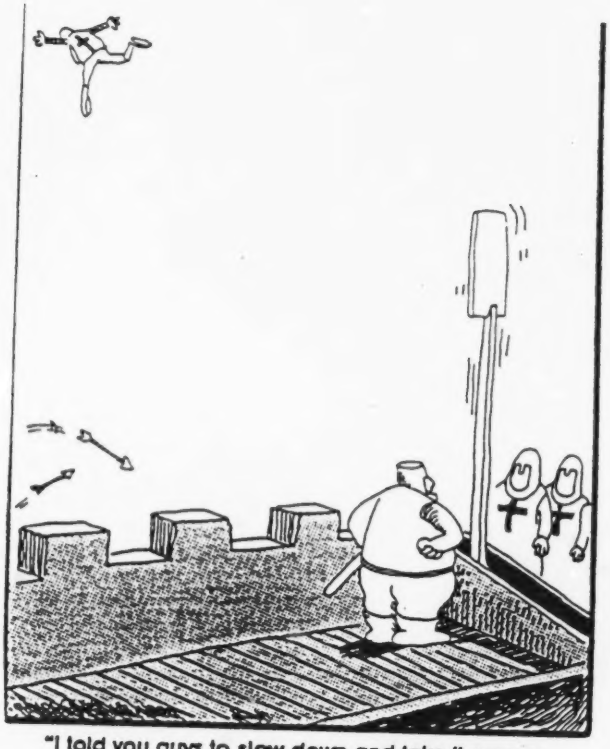
HOROSCOPE SAYS TODAY
SOMETIME TODAY YOU WILL WAKE UP
YOU WILL EAT
YOU WILL BREATHE
THEN LATER YOU WILL GET TIRED AND GO BACK TO SLEEP.
BOY IS THAT ME!



"I told you guys to slow down and take it easy or something like this would happen."

"Well, so much for the unicorns... But, from now on, all carnivores will be confined to 'C' deck."

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Baseball

By Kimberly Montgomery

On Monday,June 28 both Engelmann I and Engelmann II ventured out to Busch Stadium.To start off our adventure,there was not only the tape of the organ playing "Take me out to the ballgame" but there also was rain! After the the rain ended,the game did go on.The Cardinals came out strong and ended the game by winning 3 to 1.This game put the Cards six and a half games out of first place!Some of the games greatest moments were:The Institute's name on the welcome board,Josh starting the wave,and having Clayton asking all the girls for medication.(1)This game was a great success and a lot of fun.

(1)By the way,if anyone has some medicine for Clayton,you can still bring it to 101 Stadler,care of the Green Team.

"Okay, okay, okay . . . Everyone just calm down and we'll try this thing one more time."

"Hey! Look what Zog do!"

"You'll never get away with this!"

$2000--Where Does It Go?

By Michelle Dossett

From the time of orientation, Engelmann participants are reminded of the $2000 spent on each one of them. In case you haven't stopped to think about it, the total amount (90 x $2000) comes to $180,000! In an exclusive interview with Dr. Charles Granger, the founder of the Engelmann programs, I asked him what this sum pays for. The greatest amount of money pays the salaries of the dedicated staff who make the Engelmann programs possible. These include the secretary who coordinates all five programs, the peer coordinator (Mrs. Leonard), the evaluator (Dr. Mares), and our mentors. In addition to this there is Engelmann's huge photocopying and printing bill. This covers everything from informational pamphlets and commencement invitations to lab report sheets and letters that will be sent to us during the coming academic year. A good portion also pays for expendable lab equipment such as pipettes and pasty *E. coli* (approximately $6000). In addition, there are our gourmet lunches which cost $5.95 per person, per lunch. This list doesn't include the cost of receptions for orientation and commencement, or the food for the picnic. As one might imagine this is only a short list of the costs which go into making the Engelmann programs possible. While I was talking to Dr. Granger, Mrs. Iverson, the former co-director of the Engelmann Institute, came up and asked me to pass on a message to all of our avid readers. Should any of you become quite wealthy or would like to include any money in your wills to the Engelmann Institute, "Any donations are gratefully accepted."

Just for kicks, I came up with a list of trivial things that add up.

1. Ted Drew's ice cream (They couldn't have fit all 90 of us in the planetarium at one time and had to give us something to do.)
2. Dr. Bissen's demonstration leeches (You don't think people actually work with those things, do you?)
3. Our designer Engelmann shirts and name tags (They want to show everyone that budding scientists can dress in style.)
4. Our Engelmann notebooks (They didn't want us to have an excuse not to take notes.)
5. The buses for our field trips (They're now considered the best mode of travel. Actually, each bus costs $200.)
6. Our I.D. cards (Pictures like those cost an arm and a leg these days.)
7. Dr. Griesedieck's colored homework folders (They opted for this instead of having an astrologer come as a guest lecturer.)

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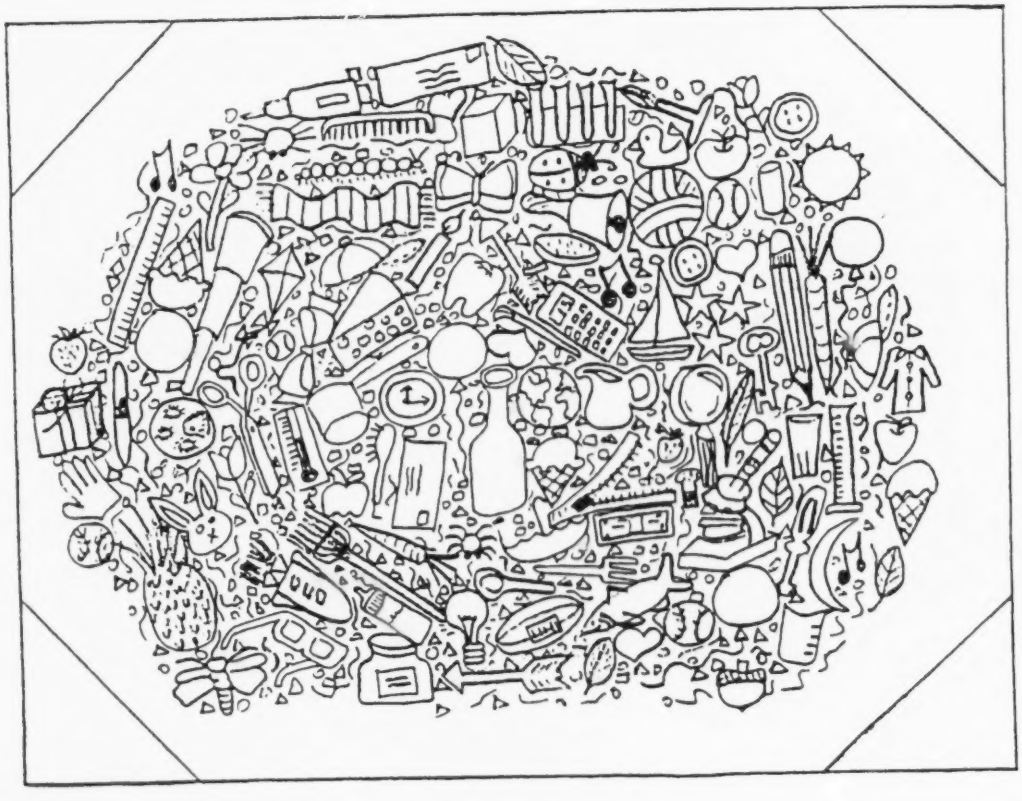
Engelmann Science Search



By: Michelle Ernst

Objects To Be Found

GLOBE
THERMOMETER
SPIDER
CALCULATOR
MAGNIFYING GLASS
LIGHT BULB
SPACE ROCKET
MICROSCOPE
TELESCOPE
MOON
PETRI DISH
STARS (3)
CATERPILLAR
TEST TUBES IN RACK
LADY BUG
GOGGLES
BEAKER
GRADUATED CYLINDER
RULER
FIREFLY
SUN
LAB COAT
RUBBER GLOVE
MICROPIPET
BUNSEN BURNER

55

Throughout the course of a typical day at the Engelmann Institute, a scholar may begin to think of being somewhere else. At this time one scholar thinks of special places they have visited. One scholars account, who wishes to remain anonymous, goes like this:

My Special Places

Perhaps a lack of tools leaves me without childhood memories. Ah but no, I was granted tools not of steel, hickory, or hand tempered with a life-time guarantee, but of human values, response, motivation, and initiative. Unfortunately these items do not carry lifetime guarantees. They do insure eternal conviction though. This conviction dictates the determined structure of which I construct my bush houses, and kindling-stave forts. The absence of such a sweet valley would not have provided the natural bridges to escape the coalition of perilous encounters. I pay homage to this great prodigious hearth and to the value of remembering. Critique for a moment rural streams versus urban billboards. So for a moment, think of my village and share my curriculum of commitment to the autonomous person and place.

The Navigator

The sail stands mighty
Supported of oaken mast
The cloth of canvas
Combed by Southern souls
Woven of strength

The vessel departs
A journey of fear
Never to arrive
High winds and tyrants
The captain's challenge

Orient due East
Cast light of fortress
Your beacon transcends
Why revoke the light
Intended pathway

My sail torn by thee
Progress is halted
I must fix my sail
My sail of greatness
Sliced by angry winds

Repair my hunger
Quench my salvation
Pour the thunder's rain
While I patch my Cloth
My Strength remains scarred

Though the ship still sails
Bound for the Harbor
The port provides safety
The waters remain
Safe, sound, and secure

Cloth's sanctuary
Bless my sacred Cloth
Adventure instilled
Return to Journey
The Navigator

George Engelmann Mathematics and Science Institute

Science Scholar Program

Confab Presenters and Career Topics

Confab Presenters	Career Topics
John Fuller KSDK-TV	Atmospheric Science
Shirley Bissen Department of Biology UM-St. Louis	Biology
Robert Murray Department of Chemistry UM-St. Louis	Chemistry
Lawrence Barton, Chairperson Department of Chemistry UM-St. Louis	Chemistry
Jacob Leventhal Curators Professor Department of Physics UM-St. Louis	Physics
Ella Swierkosz Saint Louis University	Virology

George Engelmann Mathematics & Science Institute
Science Scholar Program

Scientific & Technical Writing

Dr. T. Martin
Summer 1993

Lucas Hall 427
553-5619

OBJECTIVES

Writing in the sciences must be effective because no work or experiment, however brilliant, can contribute to the existing fund of scientific knowledge unless it has been clearly and accurately described and explained to others. Most scientists, scientific educators, and your instructor today subscribe to the concept expressed in the previous statement.

The scientific paper is the end result and demonstration of your research activity; therefore, it must be expressed in the best language and organization possible. This brief course which provides a brief overview of scientific and technical writing is designed to introduce you to the basic elements. To achieve these aims, we will cover such matters as the following:

- separating scientific and technical writing from writing in English classes;
- developing a concise, readable style;
- preparing papers with an IMRAD structure;
- preparing abstracts;
- preparing appropriate documentation;
- practicing the same degree of care in writing as is necessary in research and lab experiments.

TENTATIVE COURSE OUTLINE

Friday	6/18/93	Common Misunderstood Problems with "Writing" What is Technical and Scientific Writing?
Monday	6/21	Organizing and Outlining Writing Content I.M.R.A.D. Structure for Science Papers
Thursday	7/1	Drafting and Revising Writing Developing Concise, Readable English Preparing Abstracts of Papers
Tuesday	7/6	Editing and Polishing Final Copy

THE GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUTE

SCIENCE SCHOLAR PROGRAM

1993

SCHOLAR RESEARCH PAPERS

Friday, July 9, 1993 **University of Missouri-St. Louis**

Group 1 - Mr. Thomas Cradick, Mentor

Crissie Eckhoff, McCluer, "ECT as a Treatment for Schizophrenia"

Erica Edwards, Hazelwood East, "Risk Factors of Male Breast Cancer"

Benjamin Elgin, University City, "Fractals: Chaos to Fractional Dimensions"

Lauren Daniels, Ladue Horton Watkins, "The Genetic Link to Type 2 Diabetes Mellitus"

Ashleigh Harold, Metro, "The Causes of Sudden Infant Death Syndrome"

Maitraya Patel, Mary Institute/St. Louis Country Day, "Genetic Cloning - The Study of The Feasibility of Cloning in Higher Mammals"

Kevin Ponciroli, DeSmet, "The Effects of a Nuclear Winter on the Environment"

Ted Sanders, Affton, "Disposal of Radioactive Waste Materials"

Katrina Steiling, Notre Dame, "Genetic Influence on Schizophrenia"

Joshua Trampier, St. John the Baptist, "The Manifestation of Alcoholism"

Cindy Tochtrop, Grace Christian, "Chaotic Destruction of the Solar System"

Katherine Werner, Webster Groves, "A Study of the Deep-Diving Mechanism in Whales, and a Reasoning of Deep-Diving Behavior"

Elizabeth Wiggins, Parkway West, "Retention of the Effects of Imbibition, Near-red Irradiation, and Desiccation on Cherry Tomato Seeds"

Group 2 - Mr. Gary Kallansrud, Mentor

Kathy Bartniczak, Cor Jesu Academy, "The Causes and Symptoms of Schizophrenia"

Christy Collins, McCluer North, "The Cellular Effects of Alternating Current Electromagnetic Fields"

Chris Hanff, Christian Brothers College, "Nanotechnology and Cell Regeneration"

Ryonnell Jackson, Cardinal Ritter, "The Effects and Control of Hydrophobia"

Stephen Johannes, Ft. Zumwalt North, "An Atmosphere-Ocean Coupled Model for El Nino"

Raman Malhotra, Lindbergh, "The Effectiveness of Cholesterol Inhibitors in Preventing Coronary Heart Disease"

Diane Moellenhoff, Lutheran South, "Alzheimer's Investigating Causes"

Carie Mueller, Windsor, "Kaposi's Sarcoma and its Correlation with Acquired Immune Deficiency Syndrome (AIDS)"

Narcissa Myrick, Berkeley, "Chemotherapy and the Effect of it in Acute Lymphotic and Acute Myelocytic Leukemia"

Jessica Pryor, Central Visual and Performing Arts, "Population, Resources, and the Search for Energy: A Comparison of the Consumption in Developed and Underdeveloped Countries"

Laura Weiss, Fox Senior, "Carpal Tunnel Syndrome"

Philip Weyman, Kirkwood, "The Effects of Noise Pollution on Behavior"

Jennifer Wilber, Orchard Farm, "Harmonics"

Group 3 - Ms. Kelly Javier, Mentor

Karen Bliss, Eureka, "The Harmful Effects of Genetic Engineering"

Indraniel Das, Parkway South, "Identification of Carcinogenic Metabolites of Precarcinogen"

Tina Fanetti, St. Elizabeth Academy, "Supernovae and Their Place in the Universe"

Alleda Flagg, Rolla, "The Preparation of an Antigen for Paralytic Shellfish Poisoning: Stopping the Red Tide in its Tracks"

Susanne Friedhoff, Incarnate Word Academy, "*Catharanthus Roseus* and its Alkaloids: Preserving the Rosy Periwinkle Plant"

Jennifer Joerding, Lutheran North, "Recombinant DNA and Its Uses to Advance for a Cure of Cancer"

Jesse Kharbanda, Parkway West, "The Metabolism of *Rhodobacter capsulatus* in Aerobic and Anaerobic Environments"

Erin Long, Wright City, "Alzheimer's Disease and Aluminum"

Ryan McQueen, Lafayette, "The Increased Ability to Segment Images by Using Radar to Measure the Depth of Objects: A Study of Computer Vision"

Eric Nolte, St. Louis Priory, "The Change in Nitrogen Oxide Emissions Caused by a Change from Gas to Electric Automobiles"

Shannon Patterson, Maplewood-Richmond Heights, "Mining and Environmental Protection: New Hope in a New View Point"

Jason Pezold, Lutheran West, "The Safety and Advantages of Nuclear Energy"

Group 4 - Ms. Ellen Norris, Mentor

Tom Ballard, University City, "Nanotechnology: A Study of an Emerging Technology"

David Broyles, Westminster Christian Academy, "Cold Fusion: Fact or Fiction?"

Tonya Buckner, Riverview Gardens, "Synthesis of Artificial Pancreatic Enzyme, Chymohelizyme-1"

Judy Chen, Parkway Central, "Laser Angoplasty with Carbon Dioxide Lasers: A Medical Application of Optical Fibers

Michelle Dossett, Parkway North, "The Use of Monoclonal Antibodies in Diagnosing and Treating Cancer"

Michelle Ernst, Ursuline Academy, "The Synthesis and Use of Indigo and Other Vat Dyes"

Jonathan Feldmann, Chaminade, "Chaos in the Solar System"

Clayton Kennedy, Mehlville, "Horticultural Therapy - An Effective Rehabilitation"

Emily Leirer, Grandview R-II, "Alzheimer's Disease - Causes and Cures"

Chris Loving, John Burroughs, "Black Holes: The Engines of Galaxies?"

Mike Maniaci, Vianney, "Eliminating Resistence in a Metal Conductor"

Kim Montgomery, St. Charles West, "Chaos in the Outer Planets: A Study of Chaos in the Solar System"

Cia-Mattae Sevier, Gateway Institute of Technology, "AIDS: Killer Epidemic of the 90's"

University of Missouri St. Louis

GEORGE ENGELMANN

MATHEMATICS & SCIENCE

INSTITUTE

1993

Scholar Confirmation Ceremony

George Engelmann Mathematics & Science Institute
Summer Science Scholar Program

The 1993 Engelmann Scholars

Thomas Ballard, University City High School

Kathryn Bartniczak, Cor Jesu Academy

Karen Bliss, Eureka High School

David Broyles, Westminster Christian Academy

Tonya Buckner, Riverview Gardens High School

Judy Chen, Parkway Central High School

Christy Collins, McCluer North High School

Lauren Daniels, Ladue Horton Watkins High School

Indraniel Das, Parkway South High School

Michelle Dossett, Parkway North High School

Crissie Eckhoff, McCluer High School

Erica Edwards, Hazelwood East High School

Benjamin Elgin, University City High School

Michelle Ernst, Ursuline Academy

Tina Fanetti, St. Elizabeth Academy

Jonathan Feldmann, Chaminade College Prep

Alleda Flagg, Rolla High School

Susanne Friedhoff, Incarnate Word Academy

Chris Hanff, Christian Brothers College High School

Ashleigh Harold, Metro High School

Ryonnell Jackson, Cardinal Ritter College Prep

Jennifer Joerding, Lutheran North High School

Stephen Johannes, Fort Zumwalt North High School

Clayton Kennedy, Mehlville High School

Jesse Kharbanda, Parkway West High School

Emily Leirer, Grandview High School

Erin Long, Wright City High School

Christopher Loving, John Burroughs School

Raman Malhotra, Linbergh High School

Mike Maniaci, Vianney High School

Ryan McQueen, Lafayette High School

Diane Moellenhoff, Lutheran South High School

Kimberly Montgomery, St. Charles West High School

Carie Mueller, Windsor High School

Narcissa Myrick, Berkeley High School

Erik Nolte, St. Louis Priory School

Maitrava Patel, Mary Institute & St. Louis Country Day

Shannon Patterson, Maplewood-Richmond Heights High School

Jason Pezold, Lutheran West High School

Kevin Ponciroli, DeSmet Jesuit High School

Jessica Pryor, Central Visual and Performing Arts High School

Theodore Sanders, Affton High School

Cia-Mattae Sevier, Gateway Institute of Technology

Katrina Stelling, Notre Dame High School

Cindy Tochtrop, Grace Christian School

Joshua Trampier, St. John the Baptist High School

Laura Weiss, Fox High School

Katherine Werner, Webster Groves High School

Philip Weyman, Kirkwood High School

Elizabeth Wiggins, Parkway West High School

Jennifer Wilber, Orchard Farm High School

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George Engelmann Mathematics & Science Institute
Summer Science Scholar Program
Scholar Confirmation Ceremony

July 9, 1993

Welcome	Dr. Blanche M. Touhill Chancellor University of Missouri-St. Louis
Greeting	Dr. E. Terrence Jones Dean, College of Arts and Sciences University of Missouri-St. Louis
Introduction of Challenge Address	Dr. Charles R. Granger Professor Departments of Biology and Educational Studies University of Missouri-St. Louis
Challenge Address	David B. Price, Jr. Vice President and General Manager Performance Products Division Monsanto Company
Honorary Awards	Pamela L. Iverson Co-Director Engelmann Institute, 1989-93
	Judith P. Leonard Mentor, 1988-92 Summer Co-Director Engelmann Institute, 1993
	Craig Gilbert Robert Macke Damon Vincent
Awarding of Certificates	Engelmann Faculty Tom Cradick Gary Kallansrud Kelly Javier Ellen Norris
Reflections	Naina Bhasin Engelmann Scholar '91 National Science Foundation Young Scholar '92 Engelmann V, '93 Sophomore, University of Illinois
Summer Program Review	Engelmann Scholars
Reception	Research Atrium

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George Engelmann Mathematics & Science Institute
Summer Science Scholar Program

The1993 Faculty and Staff

Lawrence Barton, Professor of Chemistry, Department Chairperson

Shirley Bissen, Assistant Professor of Biology

John J. Boswell, Assistant Professor of Psychology

Jerry Bryant, Assistant Professor of Biology

Thomas Cradick, Mentor-Biology, Parkway North High School

Linda d'Avignon, Librarian

Larry DeBuhr, Director, Education Department, Missouri Botanical Garden

William DeLong, Scholar Assistant, Northwest High School-House Springs

Nancy K. Diley, Administrative Aide, Departments of Biology and Extension

Linda Duke, Athletic Specialist

Bernard J. Feldman, Professor of Physics, Department Chairperson

Chris Flores, Graduate Teaching Assistant of Biology

Philip Fraundorf, Associate Professor of Physics

Harvey P. Friedman, Associate Professor of Biology

John Fuller, Meteorologist, KSDK-TV

Wayne Garver, Research Scientist, Department of Physics and Astronomy

Rickey L. George, Dean, School of Education

Tim Giblin, Research Assistant, Department of Physics and Astronomy

Charles R. Granger, Professor of Biology and Education, Director, Engelmann Institute

David J. Griesedieck, Senior Lecturer, Department of Philosophy

Cris Hochwender, Graduate Teaching Assistant, Department of Biology

James H. Hunt, Associate Professor of Biology

Kelly Javier, Mentor-Mathematics, St. John the Baptist High School

E. Terrence Jones, Dean, College of Arts and Sciences

John Judd, Research Associate, Department of Biology

Gary Kallansrud, Mentor-Biology/Earth Science, Parkway West High School

Anthony Kardis, Mentor-Chemistry, Ladue Horton Watkins High School

Deborah Kettler, Director, Career Placement Services

Judith P. Leonard, Interim Co-Director and Coordinator, Engelmann Institute

Jacob J. Leventhal, Curators' Profesor of Physics

Kenneth R. Mares, Associate Director, Engelmann Institute

Terrence S. Martin, Senior Lecturer, Department of English

Lynne McCarthy, Senior Secretary, Engelmann Institute

Kathi McDonald, KWMU and WORDS & PICTURES

James J. McGarry, Jr., McDonnell Douglas Corporation

Robert W. Murray, Curators' Professor of Chemistry

Ellen Norris, Mentor-Chemistry/Physics, Christian Brothers College High School

Michael Sampson, KWMU and WORDS & PICTURES

Alan L. Schwartz, Associate Professor of Mathematics

Richard Dean Schwartz, Professor of Astronomy

Ned R. Siegel, Senior Research Specialist, Monsanto Company

Denise Silvester, Assistant Athletic Director

Ella Swierkosz, Associate Professor of Pediatrics

Teresa Thiel, Associate Professor of Biology

Bruce Wilking, Professor of Astronomy

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University of Missouri-St. Louis

Hereby Commends

for being selected and successfully
participating in the
George Engelmann Mathematics and Science Institute
Science Scholar Program
and awards the distinction of

Engelmann Scholar

on this 9th day of July, 1993

Blanche M. Touhill, Ph.D.
Chancellor
University of Missouri-St. Louis

Charles R. Granger, Ph.D.
Director
George Engelmann Institute

GEORGE ENGELMANN
MATHEMATICS & SCIENCE
INSTITUTE

THE GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUTE
"UNIFYING CONCEPTS IN SCIENCE"
PROGRAM EVALUATION
1993

YEAR: Jr. ____ DATE: _____

Sr. ____ MENTOR: _____

Directions: **We would like to obtain your views about various aspects of the Engelmann Institute. It will help refine the program as we head into future years and a new group of scholars. Please be candid. Evaluate (1-5) in order if IMPORTANCE AND EVALUATE (1-5) FOR effectiveness each of the following activities. Your comments are critical to our understanding of your evaluation. Please write your feelings as much as possible.**

IMPORTANCE RATING (Very Imp. 1 2 3 4 5 Not Imp.)	ACTIVITY	EFFECTIVENESS RATING (Low 1 2 3 4 5 High)
1 2 3 4 5	Library Workshop and Scavenger Hunt (L. D'Avignon) Comments: _____	1 2 3 4 5
1 2 3 4 5	Orientation to Science Departments Comments: _____	1 2 2 4 5
1 2 3 4 5	Basics of Technical Writing (T. Martin) Comments: _____	1 2 3 4 5
1 2 3 4 5	Digital Thought & Action (W. Garver) Comments: _____	1 2 3 4 5
1 2 3 4 5	Biochemistry (DNA) Lab (T. Cradick) Comments: _____	1 2 3 4 5
1 2 3 4 5	Variation and Uncertainty in Nature (J. Boswell) Comments: _____	1 2 3 4 5

IMPORTANCE RATING (Very Imp. 1 2 3 4 5 Not Imp.)	ACTIVITY	EFFECTIVENESS RATING (Low 1 2 3 Avg. 4 5 High)
1 2 3 4 5	Theory and Thought in Mathematics (A. Schwartz)	1 2 3 4 5
	Comments _____	
1 2 3 4 5	Essentials of Oral Presentation (K. McDonald & M. Sampson)	1 2 3 4 5
	Comments _____	
1 2 3 4 5	Molecular Biology Lab (C. Bauer)	1 2 3 4 5
	Comments _____	
1 2 3 4 5	Laser Physics Lab (B. Feldman & P. Fraundorf)	1 2 3 4 5
	Comments _____	
1 2 3 4 5	How to Write a Resume (D. Kettler)	1 2 3 4 5
	Comments _____	
1 2 3 4 5	Population Biology Lab (J. Hunt)	1 2 3 4 5
	Comments _____	
1 2 3 4 5	Philosophy of Science (D. Griesedieck)	1 2 3 4 5
	Comments _____	
1 2 3 4 5	Field Trips (Overall)	1 2 3 4 5
1 2 3 4 5	Sigma Chemical Company	1 2 3 4 5
1 2 3 4 5	Monsanto Company	1 2 3 4 5
1 2 3 4 5	McDonnell Douglas Corp.	1 2 3 4 5
1 2 3 4 5	Missouri Botanical Garden	1 2 3 4 5
	Comments _____	
1 2 3 4 5	Career confab (Overall)	1 2 3 4 5
1 2 3 4 5	L. Barton (Chemistry)	1 2 3 4 5
1 2 3 4 5	S. Bissen (Biology)	1 2 3 4 5
1 2 3 4 5	J. Fuller (Meteorologist)	1 2 3 4 5
1 2 3 4 5	J. Leventhal (Physics)	1 2 3 4 5
1 2 3 4 5	E. Swierkosz (Virology)	1 2 3 4 5
1 2 3 4 5	R. Murray (Chemistry)	1 2 3 4 5
	Comments _____	

IMPORTANCE RATING						EFFECTIVENESS RATING				
Very Imp.				Not Imp.		Low		Avg.		High
1	2	3	4	5	ACTIVITY	1	2	3	4	5
1	2	3	4	5	Science Seminar Series (Overall)	1	2	3	4	5
1	2	3	4	5	Dr. Bryant (Biochemistry/Biotech/ Genetic Eng.)	1	2	3	4	5
1	2	3	4	5	Dr. Feldman (Cold Fusion)	1	2	3	4	5
1	2	3	4	5	Dr. Friedman (Immune Response/ AIDS)	1	2	3	4	5
1	2	3	4	5	Dr. Hunt (Ecology/Pop. and Prob.)	1	2	3	4	5
1	2	3	4	5	Dr. Granger (Particles/Smarticles)	1	2	3	4	5
1	2	3	4	5	Dr. A. Schwartz (Theory & Thought in Math)	1	2	3	4	5
					Dr. Wilking (Starbirth & Solar System)	1	2	3	4	5
					Comments: _____					
1	2	3	4	5	Athletics (D. Silvester & L. Duke)	1	2	3	4	5
1	2	3	4	5	Softball	1	2	3	4	5
1	2	3	4	5	Volleyball	1	2	3	4	5
					Comments: _____					
1	2	3	4	5	Advisory (Overall Value of Time)	1	2	3	4	5
					(Choose <u>your</u> mentor only)					
1	2	3	4	5	Mr. Cradick	1	2	3	4	5
1	2	3	4	5	Ms. Javier	1	2	3	4	5
1	2	3	4	5	Mr. Kallansrud	1	2	3	4	5
1	2	3	4	5	Ms. Norris	1	2	3	4	5
					Comments: _____					
1	2	3	4	5	Social Activities (Overall)	1	2	3	4	5
1	2	3	4	5	Shaw Park Picnic	1	2	3	4	5
1	2	3	4	5	Planetarium/Observatory	1	2	3	4	5
1	2	3	4	5	Baseball Night	1	2	3	4	5
1	2	3	4	5	Pool Party	1	2	3	4	5
1	2	3	4	5	Informal Student Interaction	1	2	3	4	5
					Suggestions for Others? _____					
					Comments: _____					
1	2	3	4	5	Achievement and Peer Assessment (Overall)	1	2	3	4	5
1	2	3	4	5	Laboratory Write Ups	1	2	3	4	5
1	2	3	4	5	Written Research Paper	1	2	3	4	5
1	2	3	4	5	Oral Presentation of Paper	1	2	3	4	5
1	2	3	4	5	Pre & Post Tests	1	2	3	4	5
1	2	3	4	5	Peer Cooperation	1	2	3	4	5
					Comments: _____					

IMPORTANCE RATING (Very Imp. 1 2 3 4 5 Not Imp.)	ACTIVITY	EFFECTIVENESS RATING (Low 1 2 3 Avg. 4 5 High)
1 2 3 4 5	Commencement (Overall)	1 2 3 4 5
1 2 3 4 5	Commencement Presentation (Mr. Price)	1 2 3 4 5
	Comments: _____	
1 2 3 4 5	General Program Activities (Overall)	1 2 3 4 5
1 2 3 4 5	Pre-Orientation (June 13)	1 2 3 4 5
1 2 3 4 5	Orientation (June 14)	1 2 3 4 5
1 2 3 4 5	Engelmann Challenges (throughout)	1 2 3 4 5
	Comments: _____	

1. If you had to pick two activities to drop from the program, which would they be?
   A. _____ Why? _____
   B. _____ Why? _____

2. If you could add any activity, what would it be?

   _____

3. For your own development and understanding, which activity was most beneficial?

   _____
   _____

4. Considering the overall program, what would you change to make it better and why?

   _____
   _____
   _____
   _____

5. What is the most significant thing that you got from the Engelmann Institute?

   _____
   _____
   _____
   _____

6. Please comment on <u>your</u> mentor only, both as general faculty and as your advisory mentor.
   Mr. Cradick _____
   _____
   Ms. Javier _____
   _____
   Mr. Kallansrud _____
   _____
   Ms. Norris _____
   _____

7. The time schedule of events was . . . _____ just about right.
_____ too free and open.
_____ packed too heavily.

Comments: _____

8. How beneficial did you feel the Institute's overall program was to you? Did it make you think about new areas and ideas? If yes, please give examples.

_____
_____
_____

9. How did the Engelmann Institute differ from your past high school experience?

_____
_____
_____
_____

10. How was your perception of the University of Missouri-St. Louis changed after your Institute experience?

_____
_____
_____
_____

11. The objectives of the Engelmann Institute are diverse and attempt to demonstrate the connecting threads running through all scientific disciplines. Please indicate on the continuum to what extent you feel the objectives were achieved.

a. Enhanced my knowledge of current topics in biology, chemistry, math, physics, psychology and related technical fields.

not achieved at all _____ _____ _____ _____ _____ achieved very much
1 2 3 4 5

b. Provided me with an understanding of the philosophy of science and the total scientific enterprise.

not achieved at all _____ _____ _____ _____ _____ achieved very much
1 2 3 4 5

c. Exposed me to the theory and application of statistical analysis.

not achieved at all _____ _____ _____ _____ _____ achieved very much
1 2 3 4 5

d. Instructed me in technical writing, the preparation of formal scientific papers, and the skills of oral presentation of papers.

not achieved at all _____ _____ _____ _____ _____ achieved very much
1 2 3 4 5

e. Allowed me to use scientific techniques, equipment and practice laboratory skills in an open-ended, problem solving setting.

not achieved at all _____ _____ _____ _____ _____ achieved very much
1 2 3 4 5

f. Allowed me to explore one or more scientific problems.

not achieved at all ____ ____ ____ ____ ____ achieved very much
1 2 3 4 5

g. Provided me with assistance and general help for continued work on independent student research projects.

not achieved at all ____ ____ ____ ____ ____ achieved very much
1 2 3 4 5

h. Provided an opportunity for me to interact with my peers and reinforced our similar interests and goals.

not achieved at all ____ ____ ____ ____ ____ achieved very much
1 2 3 4 5

i. Introduced me to a wide variety of career opportunities in science and technology.

not achieved at all ____ ____ ____ ____ ____ achieved very much
1 2 3 4 5

j. Provided me with an academic framework in which to integrate the mathematics, technology, science, art, humanities, and the athletic component of the human experience.

not achieved at all ____ ____ ____ ____ ____ achieved very much
1 2 3 4 5

12. What comments would you like to make regarding the Engelmann Institute in general?

_____
_____
_____
_____

THANK YOU VERY MUCH FOR YOUR HELP WITH THE EVALUATION. KEEP IN TOUCH WITH US AND LET US KNOW HOW YOU ARE DOING. PLEASE RETURN THIS QUESTIONNAIRE IN THE ATTACHED ENVELOPE BY JULY 17, 1993 TO:

Dr. Kenneth R. Mares
Associate Director
Engelmann Institute
University of Missouri-St. Louis
8001 Natural Bridge Road
St. Louis, MO 63121-4499

THE GEORGE ENGELMANN MATHEMATICS AND SCIENCE INSTITUTE PROGRAMS

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The George Engelmann Mathematics and Science Institute
gratefully acknowledges the support from the
UM-St. Louis Pierre Laclede Honors College for the publication of this report.